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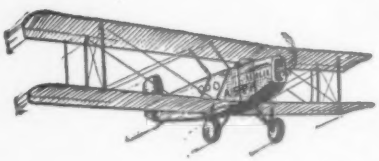

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POPULAR AVIATION

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Volume 2 FEBRUARY, 1928 Number 2

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A New Conquest

Lindbergh at Mexico City. Photo taken a moment after his arrival.

A NEW type of diplomacy, which apparently has better and more immediate results than the old fashioned kind, has been demonstrated in the visit of Colonel Charles Lindbergh to Mexico and the Central American Republics.

The title conferred on Lindbergh by Ambassador Herrick in Paris months ago, "Our Unofficial Ambassador," has become more than a phrase. This visit of Lindbergh has done more to cement good relations between our great republic of North America and our smaller sister republics to the south than any other efforts, official or private.

Coming at a time when relations between the United States and Mexico were none too cordial and certain matters relative to oil concessions were about to come before the Mexican congress with possibly disastrous results to American capital, the visit was not only well timed, but probably averted another exchange of notes between the two countries.

Little publicity was given to the flight before hand. It was known at the aviation conference, held in Washington the week of December 5-10, that the Colonel was to make the flight, but the full significance of the venture was not realized except, possibly, in official quarters. It was looked upon as simply another demonstration of the ability of this young flyer and as another opportunity to show the country the advantages of air transport over other means of covering distance.

So little was said about the projected flight that it was assumed that some official announcement would be made, and that it might be simply another rumor about this much talked of young man who does so little talking himself. As a matter of fact, no official announcement was made and no official orders were given. The preparatory help given to Lindbergh at the army field was simply the help any flyer in the country would have been glad to render.

Bolling Field, where the journey started, is not an ideal field, especially for planes carrying maximum loads for non-stop flights. The surface was wet and muddy and there were a few boggy holes that could not be filled up owing to the probability of the trucks being bogged down and remaining a menace to the take-off.

Our flying ambassador went over the field a number of times in order to select the best possible path for his take-off. No special runway was prepared for him and the field lacked one long enough for the Spirit of St. Louis with its maximum load.

Lindbergh noted the depressions in the field, marked the boggy spots with flags, and took notice of all the inequalities of surface as well as the bordering obstructions.

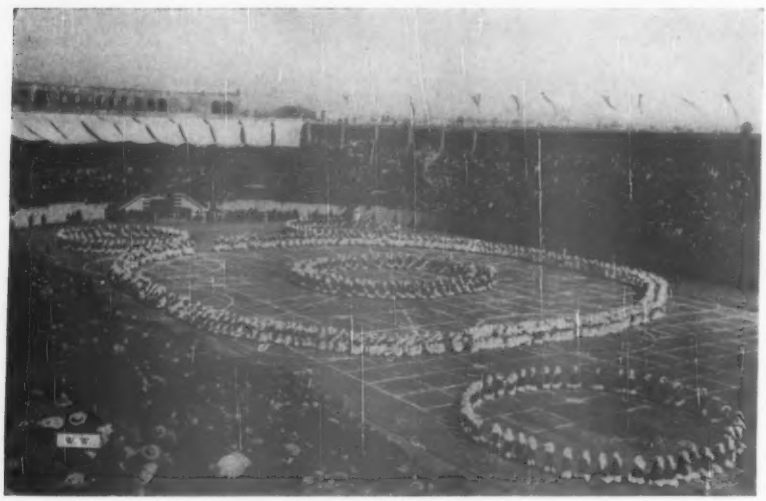
At 12:29 p. m., December 13, he tramped down the field after the Spirit of St. Louis, which was being wheeled to the starting point by army mechanics. The plane had been kept in a heated hangar and had been carefully gone over by the mechanical personnel stationed at the field. It had been fueled and tested under Lindbergh's own supervision.

A moment later he had donned his flying togs and was ready for the take-off. Pilots who saw the take-off are ready to concede that it was perfect. It is no idle task to take a plane with a maximum load off a soggy field, but this was done with a careful coolness that was appreciated by everyone who saw the start. The Spirit of St. Louis weighed in the neighborhood of two tons when fully loaded, and he lifted it over the soft spots, eased it down on the harder ground without bouncing, kept the nose down and lifted it off at the end of the field by the river side. Nine escort planes left with him and accompanied him for about an hour.

Lindbergh himself states that in many ways the flight was the most

interesting one he had made. The weather was not good. No storms or gales were predicted, but the flight was made in the face of a forecast of wet and hazy weather. In this respect the flight deserves notice. It was not delayed for ideal weather and represented average winter conditions.

The flight was interesting from the standpoint of night and instrument flying. On his flight to Paris he had flown "by instrument" or "blind" for three hours or less, but this trip required five hours of flight during which it was impossible to tell if the plane were on an even keel except by careful watching of the instrument board. The Paris flight required slightly more than five hours of flying in darkness, while more than thirteen hours of the trip to Mexico City was spent in the dark and under conditions that made visibility very low.



A few people gathered to do honor to the best known flyer.

Almost immediately after leaving Washington he ran into clouds and haze. This condition prevailed until nightfall, which occurred shortly before six o'clock while he was over North Carolina in the mountains. From that time until the moon rose, five hours later, he was compelled to fly by instruments, as it was only occasionally that he could make out lights on the ground.

His first clear sight of the ground after leaving Washington came when he was over Mississippi. He then plotted his course to the Gulf of Mexico and followed the shore line of the coast.

Immediately on reaching the Gulf, fog was encountered which lasted for two hours, and then recurred intermittently. This forced him to fly at times very close to the water. As a matter of fact, he was well down on the Mexican coast before he was able to make a positive check of his course by locating himself and checking his route.

Up to this time he had had the benefit of accurate maps, but the maps of the Mexican territory which had been secured in the United States were not particularly accurate.

Tampico was recognized easily by the great oil tanks, although the city itself was shrouded in fog. He flew down within fifty feet of the river but was unable to get under the fog, so he went over it and set a compass course for Mexico City. At a thousand feet he was above the fog and clouds and on his last trip over strange territory.

Two and a half hours later he came down out of the clouds and Mexico City was not in sight. According to all calculations he should have been within sight of the capital city. Lindbergh estimated that he was about fifty miles west of his course, but offers no excuse for the deviation except to state that he must have made a mistake somewhere.

As a matter of fact, he had been maintaining an accurate compass course all night and errors crept in only during the daylight flying over the Mexican mountains. There is a possibility of compass variation that might be taken into consideration.

The flyer then circled and watched carefully for some town that would set him on his course again. Finally he located Toluca by means of the sign on the hotel and set his course again for Mexico City, where he arrived at 3:39 p. m., Dec. 14.

His greeting was stupendous. Lindbergh's own statement is that "there is a difference in all receptions and that of Mexico has been unique and will be long remembered."

The flying field at Mexico City is large and level and in beautiful condition. Made on the bed of an old lake it is flat and has long, well-kept hard runways. Mexico City is situated in a bowl shaped depression in the mountains and is 8,000 feet above sea level. Take-offs are not as easy on the Mexico City field as they are at most places in the United States, owing to the altitude and the thinness of the air. Longer runs are required.

Mexico is a country of long distances and difficult communications owing to the mountainous nature of much of the country. Aviation has naturally become a topic of the greatest interest as it represents a much greater saving in time than it does in this country. The employment of aircraft for transportation of either passengers or express shows much greater economies in the southern republics than it does in the United States, as these countries do not have the network of highways and railroads that make for easy access to all parts of the nation.

Mrs. Lindbergh had meanwhile been invited by the Ford-Stout organization to fly to Mexico City in order to spend Christmas day with her son. Accordingly, the trip was made, with several scheduled stops, in one of the Ford-Stout all-metal tri-motor jobs. This was the first tri-motor job seen in Mexico and aroused a great deal of interest, so much so, in fact, that arrangements were immediately made through the state departments of the two countries for the temporary lifting of the American embargo on aircraft so that the plane could be purchased by the Mexican government.

On December 28th Lindbergh left Mexico City early in the morning and flew the 675 miles to Guatemala City, the capital of Guatemala. Flying at an average altitude of 7,000 feet he covered the distance in seven hours and five minutes. The route lay past Popocatepetl, Mexico's great volcano, and several other volcanic mountains in both Mexico and Guatemala. The weather was foggy at times, but Lind-

bergh had no trouble in maintaining his course.

Two days later, on December 30, he left Guatemala City for Belize, British Honduras. Belize has a landing field on a polo ground and it was not known by Lindbergh in advance whether it would afford him a safe landing place. Consequently, he planned to look the field over and land if possible, otherwise, to continue his journey. He found the field to be 400 yards long and after dragging it twice decided that it afforded a safe landing for him and that he could leave it when the time came for a take-off.

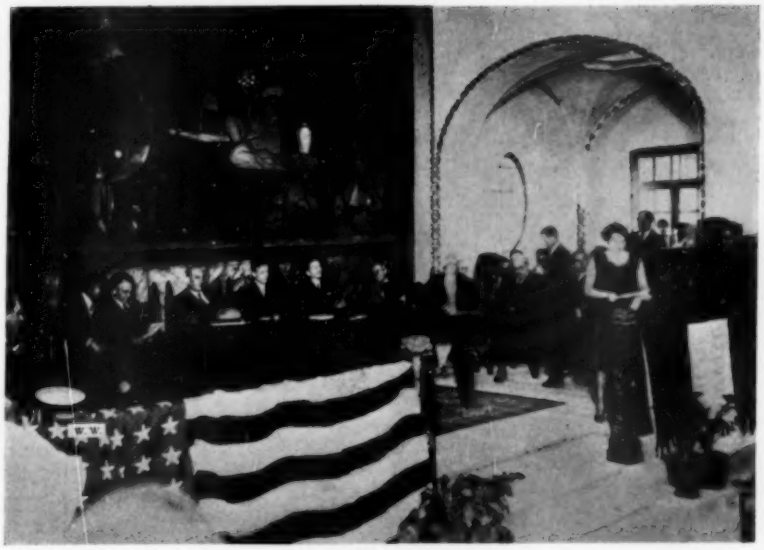
On New Year's day he left the hospitable town of Belize for San Salvador, making the 260 mile trip in two hours and fifty minutes. While this is one of the short hops of the journey in point of distance it affords a splendid example of the time saved by air travel in this part of the world.

To make the trip from Belize to San Salvador ordinarily requires three days of the toughest sort of traveling. It involves the chartering of a launch in case one of the infrequent ships is missed, for the coastal trip to Puerto Barrios, then a trip by narrow gauge railway to Guatemala City, and then 15 hours of automobile traveling over roads that had best be not described.

From San Salvador the Colonel's trips extended to Tegucigalpa, the capital of Honduras, thence to Managua in Nicaragua, to San Jose in Costa Rica, and to Panama.

Invitations have been extended for him to visit Bogata in Columbia, S. A., as well as Caracas, Venezuela, and Trinidad. This makes the trip a circular one that skirts the entire Caribbean Sea, as his route after leaving Trinidad, the island off the coast of Venizuela, would be to swing northward over the Lesser Antilles, then westward to Porto Rico. From there the route would extend to Santa Domingo in the Dominican republic, then across the island to Port au Prince, Haiti, and then a flight the length of Cuba to Havana. From that point of course he would follow the regular line to Key West, Miami and thence back to St. Louis, which will be another non-stop flight.

Up to the present time the Spirit of St. Louis has had over 400 hours of flight, which means, roughly, 40,000 miles. Many motorists would hesitate to take a car that had gone that many miles on a lengthy trip and it is a rather striking demonstration of the perfection of the Wright motor that in all this time there has not been one forced landing because of motor trouble.



Scene at the opening of the Lincoln Memorial Library at Mexico City.

With his usual modesty Lindbergh has had little to say about the effect of his visits to the various capital cities to the south of us. One example can be given. During his stay in Mexico City the Mexican congress passed a law nullifying the retroactive section of some former legislation that affected the oil interests in and about Tampico. It has been stated that the passage of this law was due simply to the goodwill engendered by our unofficial ambassador.

Unquestionably his visit has been responsible for the agitation in Congress to lift the ban against the export of aircraft to Mexico. This action will be followed by an immediate increase in business for American manufacturers of aircraft. Mexico is vitally interested in air transport.

Air transportation pays in the Central American states. The recent agitation with reference to the establishment of a foreign owned commercial line with a route over the Canal Zone has called attention to the fact that if we do not aid in the establishment of air routes through this region we cannot well stand in the way of countries who are willing to invest their

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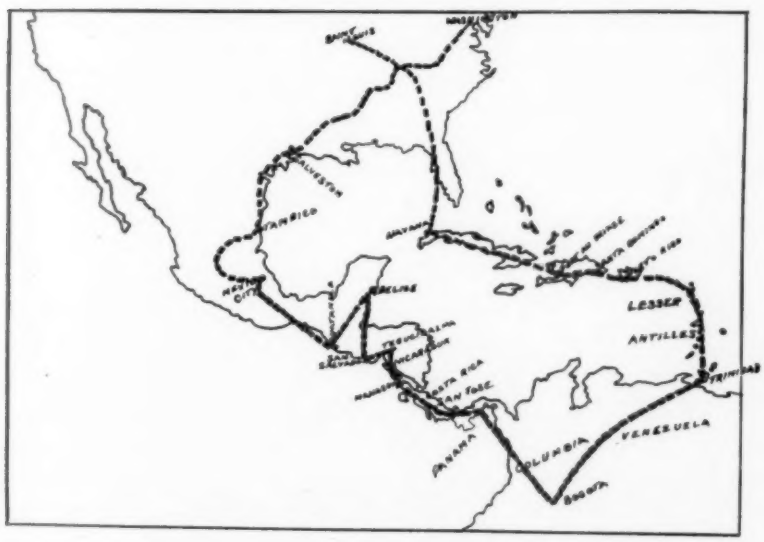


One of the Amphibian Scouts used by the Coast Guard for locating derelicts.

The Coast Patrol

By George H. Dacy

AN efficient quintet of amphibians and seaplanes owned by the U. S. Coast Guard and stationed at Gloucester, Massachusetts, and Cape May, New Jersey, is recruited for extraordinary service.

The achievements of these air cruisers have written another interesting chapter in the history of American aviation advancement. These are merely introductory to even greater accomplishments by Coast Guard aviators who will scout from the sky.

In 1916 Congress authorized the U. S. Coast Guard to establish ten aviation bases along our 10,000 miles of coastline and at strategic points on the Great Lakes. At that time, our national legislators were enthusiastic about the unplumbed potentialities of travel by air. They predicted amazing future exploits for Coast Guard birdmen and maintained that aircraft would be the most efficient accessories to the activities of that arm of the Government service in saving life and property.

The exigencies of the world war and subsequent postwar economies prevented the enactment of the aeronautical program which Congress had planned to foster for the U. S. Coast Guard. Federal appropriations were not made to finance the establishment of the aeronautical depots and centers along the Atlantic, Pacific, Mexican Gulf and Great Lakes waterfronts. The campaign lay dormant until 1926 when Congress provided funds for the purchase of three amphibians and two seaplanes. Two amphibians and one seaplane were assigned to the Gloucester, Mass., Coast Guard station while one amphibian and one seaplane were located at the Cape May station.

These five aircraft have been used in unique experimentation as well as in practical service. The results have been so outstanding that it will only be a matter of a few months until our federal lawmakers supply additional funds to increase the Coast Guard flying fleet and to equip other stations along our salt water sidelines with boats which will navigate the great aerial ocean. It is probable with the seating of the next presidential administration that the important business of establishing the Coast Guard aviation bases will hatch into a reality.

One of the leading motives which impelled Congress to equip the Coast Guard service with the planes was the possibility of using the amphibians and seaplanes as scouts and spies in the rum running warfare. Aircraft have been very effective in that patrol work and have aided materially in the abolition of "Rum Row" which formerly catered to the needs of the bootleggers along the Long Island and New Jersey coasts.

More spectacular work has been accomplished, however, in the daily patrol for derelicts, in the location of ships in distress, in fishing reconnoiter and in carrying aid to persons or ships imperiled along the coast.

The extensive commercial fishing fleet which sails from Gloucester and other fishing ports along the New England coast has, since its beginning, wasted time in searching for schools of fish. Not infrequently several days were spent by the fishermen in scouting for fish schools. Millions invested in fishing equipment, crew hire and

vessels were idle until the fish could be found.

Coast Guard seaplanes and amphibians have proved invaluable as fishing fleet scouts. The fleet remains at anchor while the aviators soar far out to sea. The observer in each plane uses powerful binoculars to scan the water for schools of fish. The schools are easy to locate as the fish swim relatively close to the surface and are concentrated in such large numbers that they are readily discernible. The planes fly low, at an altitude of 400 to 700 feet during these reconnoiters in the interest of commercial fishing.

Usually in from one to one and one-half hour's scouting trip, the Coast Guard plane will locate a large school. The observer, by means of his navigational instruments and charts, will identify the exact location of the fish. This information is then charted so that it can be passed over to the fishing captains in a form which they can readily understand. As soon as the plane returns to the port, the commercial fleet puts out to sea, steering straight for the point where the school is located.

This fish scouting work does not interfere with the regular patrol activities of the Coast Guard planes. The observer watches for derelicts, ships in distress and rum-running ships in concealment as he scans the ocean for the schools of fish. As the Coast Guard flying fleet is extended, the fish scouting surveys will be increased until eventually they will cover the most important fishing banks in Atlantic and Pacific as well as Mexican Gulf waters where fish schools assemble.

Waterlogged wrecks and other floating obstructions found in salt water are menaces to navigation. During foggy weather or in the dead of night, a passenger vessel or freight boat may collide with one of these derelicts and be damaged so seriously as to sink and endanger the lives of all on board. Derelicts run the gamut of practically all seafaring articles of equipment which will float. The huge bodies of dead whales on occasion have been the causes of dangerous shipwrecks. Wharf parts, piling, docks, spars, masts, timber, motor boats, boilers, row boats, wreckage, buoys, lumber-laden vessels which have been burned to the waterline—these and many other floating perils add grave dangers to the mariner's life at sea.

On a clear day when flying at an altitude of 1,000 feet, the Coast Guard observer in one of the planes can scan the sea for a radius of 15 miles in all directions. Whenever he locates a derelict he immediately charts its exact position. Via wireless, the observer then gets into communication with the nearest Coast Guard cutter or shore station and advises the position of the derelict. The plane continues to circle around the derelict until a Coast Guard boat appears to destroy it. By these maneuvers, the plane guides the Goverment boat to the derelict.

The destruction of derelicts is sometimes swift and spectacular but on many other occasions it is fraught with great difficulty. TNT mines, gunfire and ramming are employed as practical weapons of destruction. In certain cases, the waterlogged wreck is so large that it is impossible to destroy it on the open sea. It is towed ashore and there destroyed. If the wrecked ship or derelict is worth saving and the distance is not too great the Coast Guard cutter tows it to the nearest port and notifies the owners.

Curiously, the floating body of a dead whale occasionally causes the Coast Guard considerable trouble. The customary system of destruction is to place a TNT mine in the lower portion of the whale's body in order to blow it up. If a mine cannot be used, the whale is towed anywhere from 20 to 40 miles out to sea and then riddled with gun fire so that it will sink. The body floats because it is buoyed up by its natural inflation of gas, which occurs when decomposition begins. The gunfire from the Coast Guard cutter riddles the body with holes. The gas then escapes and the whale sinks to Davy Jones' locker.

Lumber-laden wrecks rank among the most dangerous derelicts which add hazards to seafaring life. The crews of passing ships who sight the wrecks frequently set fire to them in the vain hope of destroying them. This is the worst possible procedure. The wreck usually burns to the waterline. Then the fire dies out and the submerged derelict develops into a menace to navigation. During storms, foggy weather and at night, it is very difficult for ships to avoid collisions with these waterlogged obstructions. Whenever the Coast Guardsmen locate such a derelict they destroy it with mines, if possible, or else tow it ashore and end its existence as a menace to navigation.

Icebergs sighted by planes are reported to the Coast Guard Cutters.

Last year as a result of the use of aircraft for derelict scouting as well as through the agency of reports received from ships which passed derelicts at sea or along the coast, 101 of these floating perils were destroyed or removed from the ocean. These derelicts included rafts, logs, scows, mines, spars, boomsticks, deadheads, fish traps, skiffs, canoes, motor boats, buoys, iron boilers, wrecked schooners, transmarine barges, docks, trees, seine boats, wooden cribs and duck blinds.

A typical case of a difficult task in

derelict removal was that of an abandoned schooner which was afire and damaged beyond repair. It took 12 days of hard labor for Government cutters to beach this wreck finally near Folly Inlet, North Carolina. Twenty TNT mines were placed and discharged in futile efforts to destroy the wreckage at sea. Then it was towed 300 miles and ultimately beached along a deserted stretch of coast.

The hazards in placing TNT mines under wreckage are great. Wrecked vessels often capsize or are floating on one side with the rigging submerged. This makes it practically impossible to place a mine underneath the wreckage by means of chain cables. Divers tow the heavy mines to favorable positions below the hull. The Coast Guard records cite cases where as many as 40 of these mines were exploded before particularly stubborn wrecks and derelicts were blasted. This campaign of destruction is costly but it is essential in the promotion of safety of life at sea.

A dead whale located near Sandy Point, Block Island, was towed 40 miles to sea and there destroyed by gunfire. A wrecked ship located near Cape San Blas with two spars projecting 15 feet above the water was destroyed with mines. A waterlogged float was found at sea off Atlantic City and towed ashore. A motorboat found adrift, damaged beyond repair, was destroyed by gunfire and ramming. A huge iron boiler found adrift was sunk by gunfire. A huge section of drydock along the coast went adrift and was found 350 miles out by the Coast Guard cutter and towed ashore. It was a grave menace to navigation. These are but a few of the many derelicts removed from harbors and steamer lanes by Coast Guard vessels after being sighted from on high by Government planes.

When Coast Guard planes are provided for patron on the Pacific coast, some of them will be used each year in the location and study of the mammoth icebergs—stupendous derelicts weighing millions of tons which endanger ships during the period from mid-March until early July.

At present, three Coast Guard ships —the Modoc, Mojave and Tampa police the steamship lanes and keep constant tab on the positions of all the dangerous icebergs. These vessels send out radio messages three times daily during the iceberg season advising all ships that ply the North Atlantic Ocean about the positions and movements of these huge derelicts of ice.

Tuning up one of the OL-5 Amphibians used by the Coast Guard.

The seaplanes and amphibians, due to the large areas which they can patrol in short periods, will increase the efficiency and accuracy of the iceberg patrol. The meeting of the Gulf Stream and the cold Labrador Current in the vicinity of the Grand Banks, Newfoundland, generates great fogs and much non-flying weather, but aircraft can be used advantageously as supplements to the established water patrol. If there be but one or two flying days a week during the iceberg season, the planes can cover such extensive "beats" on those favorable days as to be of great assistance to the Coast Guard ships.

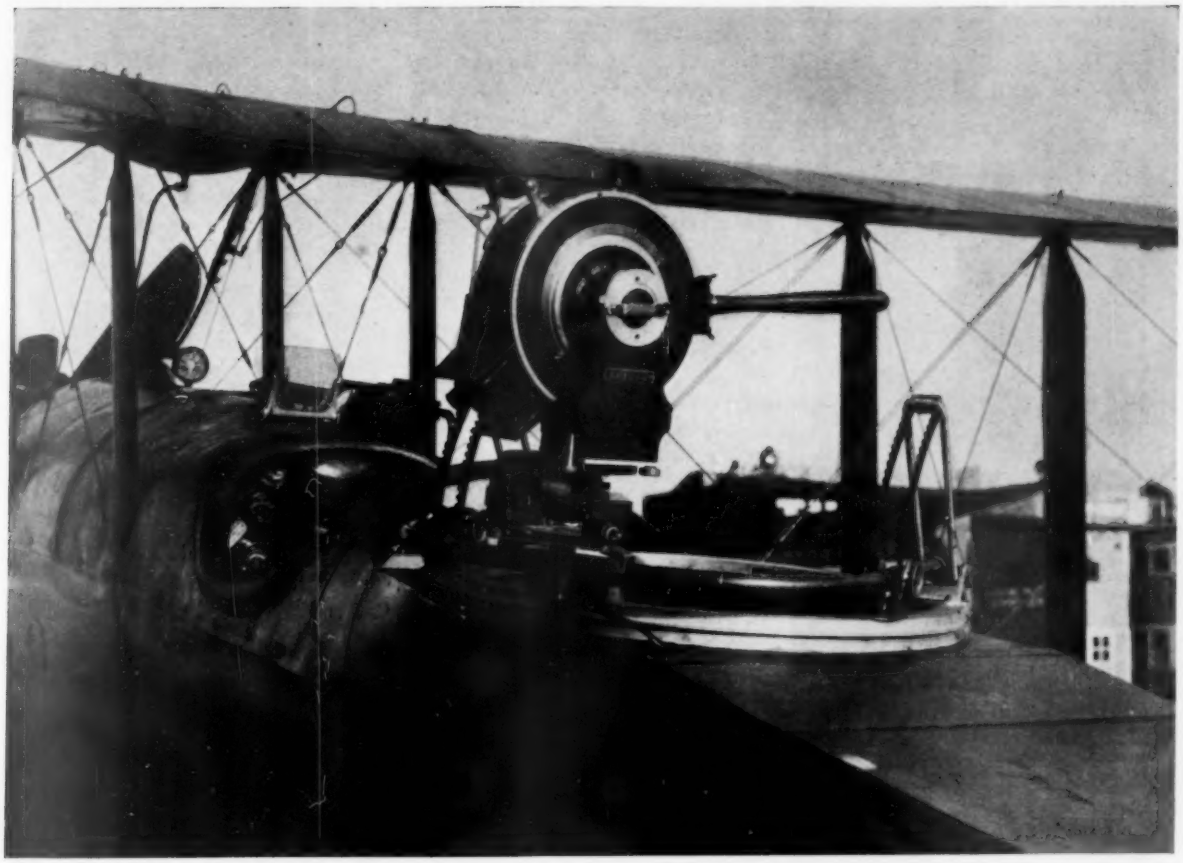
Future developments in this international ice patrol campaign—a dozen foreign countries cooperate with Uncle Sam in the enterprise—will probably see the Coast Guard ships equipped with special catapults so that the planes can take off from the vessels even during stormy weather. The decks of these ships are not large enough for landing purposes. Distances are so great and shore stations so remote in the iceberg belt that planes will have to be carried as supplementary equipment on ships.

Uncle Sam has experimented extensively in the attempted destruction of icebergs before they float southward and reach the North Atlantic steamship lanes. Icebergs weighing millions of tons, from 500 to 1,000 feet long, one-half as wide and with only a fraction of their height above the water line are very difficult to destroy at anything but most prohibitive costs. A number of 600 pound TNT mines if well-placed and fired will sometimes divide the original berg into two mammoth portions. On account of the slippery surface of the berg it is very difficult to place the mines. It is out of the question to use divers to submerge the mines below the floating bergs and neither can this be accomplished by any known —and practical—mechanical means.

The use of thermite bombs tossed from seaplanes is effective to a limited extent in the destruction of the smaller bergs. These bombs are charged with a heat-producing product. After falling upon the iceberg, the bomb burns its way into the mighty mass of frozen water. If the individual charge is large enough and a sufficient number of these bombs are used, the iceberg may be split into a number of smaller bergs. The average iceberg dissolves in from 10 to 12 days after reaching the waters warmed by the Gulf Stream. At from 36 to 50 degrees, the melting of the massive icebergs is comparatively rapid. The U. S. Coast Guard has abandoned scientific attempts to destroy the icebergs by any other means. The patrol ships—and future seaplanes and amphibians—keep close watch on the dangerous derelicts as they are carried by ocean currents through the regular lanes of ship travel. By warning ships of these floating perils, the Coast Guard has prevented any loss of life or ships due to iceberg collisions since the terrible Titanic disaster in April, 1912—the catastrophe which was responsible for the creation of the international ice patrol service.

The Navy Department has co-operated with the Coast Guard in the se-

(*Continued on page* 82)



The Motion Picture in Aviation

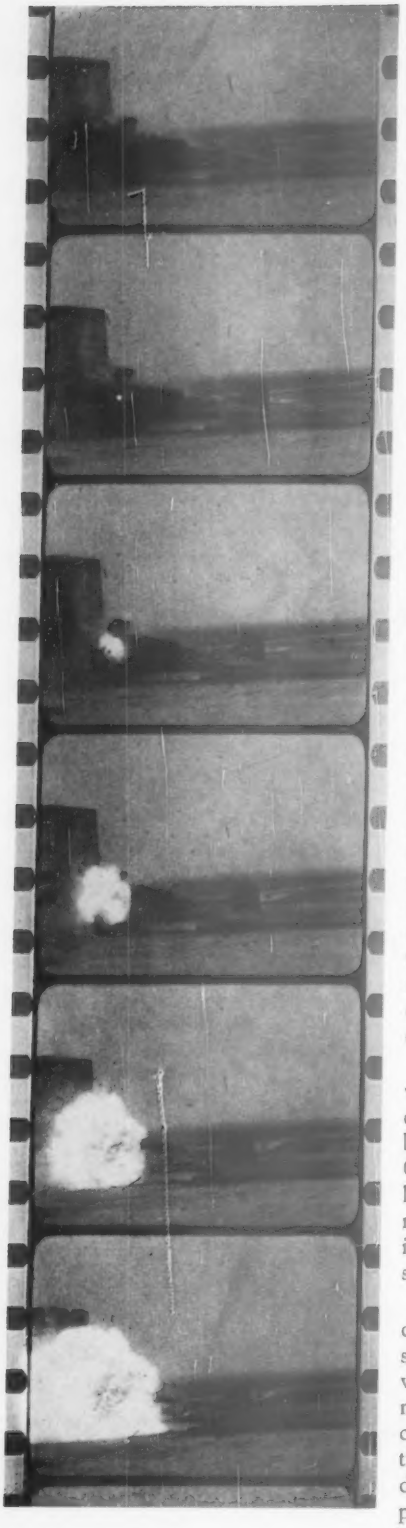
By A. M. Jacobs

WE have all seen the effect of aviation upon the motion picture, how eagerly the scenario writer has seized upon its color and speed of action to heighten the thrill and romance of an unfolding story. In many instances it has been made the very basis of the movie plot. But few are aware that the reverse of this is also true, that the motion picture is used in aviation as surely as aviation is used in the motion picture, and has played a rather important role in the unfolding story of aviation development.

Ever since the war the moving picture camera has been in use at the Materiel Division, Army Air Corps (Wright Field, Dayton, Ohio), making its records of national and international air races, special flights, record-breaking performances, and there has been accumulated a library of films of value for historical and lecture purposes of no mean order. This, however, has not been its main function, for fully 75 per cent of the pictures made have dealt with test work in experimental projects and equipment. Of these pictures of tests, about 50 per cent are normal action and about 50 per cent slow motion pictures. When the action is so fast that the normal action camera fails to get a clear record, the ultra-speed camera, which produces the slow motion picture, is resorted to. The normal action camera takes sixteen pictures a second, the ultra-speed camera in use at the Materiel Division takes two hundred and fifty pictures a second, and there are at present many of higher speeds on the market.

There have been instances when the two hundred and fifty picture a second camera has not been sufficiently fast to get the information desired. One of these was when it failed to show the origin of propeller breakage in a wooden propeller revolved at great speed. One of the higher speed cameras would no doubt have been successful in procuring this information for the engineers, to whom at the time it would have been of great value.

But on the whole, the contributions of the motion picture in test work have been extremely important. It is well known that vision or personal impressions are not unfailingly reliable even in the ordinary activities of life. Moreover, engineers who have been associated with a project are bound to have worked out certain theories concerning it which may be right or wrong, but which must subconsciously prejudice both vision and impressions to a certain extent. In the first crash tests of 1924, when obsolete airplanes were sent down a runway into a concrete wall to ascertain the origin of



Crash Test: The origin of the fire is clearly shown in the white spot on the second picture.

fire, at that time too frequently the result of crashes, some dozen observers had as many ideas as to what they had actually seen in the three-fifths of a second it took the plane to collide with the wall and burst into flames. The slow motion picture was brought into play, with a panchromatic film, which photographs the color red as white and which clearly pictured the fire at the instant of inception as an unmistakable white dot which quickly spread. The camera leaves no room for vagueness. There pictured clearly is the record of action, each detail of which may be studied as deliberately and repeatedly as the careful student of the situation may desire.

The motion picture has also played a part in the successful development of the parachute. As early as 1920 pictures were taken in the air of both lift-offs and jumps. A chronograph used with the camera gave the exact time of each exposure so that the time required for the pilot parachute to leap out, drag the main chute from the pack, for the main chute to fill with air and check the jumper's fall could be correctly computed. In these early jumps the pictures showed the time to be longer than had been estimated by the engineers, which meant change in design until the time of opening was reduced. Pictures were taken of several hundred parachutes in action in those days and they have continued to be taken upon occasions of any change in design ever since.

Other tests of special interest in which the motion picture has been employed have been the bombing of battleships, the spinning tests on the O-1 and O-2 airplanes, tests of flashlight powder used in night photography, photographing of air vortices in the wind tunnel, target glider and shock absorber tests.

Shortly after Lieutenant Barksdale's death, Lieutenant H. A. Sutton, with special safety devices, put the observation planes through a series of spinning tests in order to discover the cause and character of spins such as the one from which Lieutenant Barksdale had been unable to right his plane. Since these spins had to be made at high altitude, a telephoto lens was used with the motion picture camera stationed on the ground, which magnified the size of the plane about eight times. A chronograph was also used with these pictures in order that

Air Vortices forming about wing tip suspended vertically in wind tunnel.

the exact time of the spins might be computed. The duration and angle of spins, it was considered, would be most important factors in the gathering of data upon autogyration. Also, when weights were dropped in order to recover from spins, the action of these weights when suddenly released, as well as the subsequent recovery of the plane from the spin were accurately shown in the pictures. The knowledge on the characteristics of spins was greatly augmented by these tests and their picturization.

One of the chief difficulties in the way of successful night flashlight photography from the air was the procuring of a flash fast enough not to blur the objective on the film, because of the speed of the plane during burning time. The speed of flash of many varieties of flashlight power was timed by motion picture tests.

The Materiel Division, so far as is known, is the only organization which has ever obtained photographs of air. By driving air through the wind tunnel at extremely high velocity, it was found that a moisture condensation was formed about the tips of wings and horizontal surfaces suspended in the tunnel. These air vortices could be profitably studied in the motion pictures made of them. This led to the photographing of the flow of smoke past models suspended in the tunnel. Motion pictures have also been taken in flight, showing the action of air about certain tail surfaces, the design of which were problematical, through the use of smoke candles. A smoke candle was also released immediately previous to the release of the target glider in order to foretell from the wind the probable path the glider would take in drifting to earth, so that the photographic plane could follow it down more closely.

The most recent tests taken with the ultra-speed camera have been the dynamic tests on oleo shock absorbers. In these tests a scale to the right shows the height of each drop, while from the location of a pointer on a dial actuated at a known speed, the time of the drop may be computed. The load imposed on the shock absorber is known, although both load and height of drop are changed in subsequent test until failure of the equipment. These slow motion pictures show the acceleration of the load upon striking, then the deceleration as the shock absorber starts to function, and the complete action of leg and rubber disks.

Twenty-Nine Below Zero—Mr. Hagemeyer in the photo cockpit.

"Animation" photography has also had its uses in aviation for classroom purposes and the inside working of superchargers, bomb sights, radio beacons and certain instruments have been pictured more clearly than words could describe them. This work has been temporarily discontinued but will, no doubt, be resumed at some future date because of its great value for instructional purposes.

The chief of air corps is establishing in Washington an air corps motion picture library, where films on various aviation subjects may be obtained on loan for lectures, clubs, societies and educational uses. Since the inception of this work at the Materiel Division, Mr. Louis Hagemeyer has been the motion picture photographer and his work in this line has been outstanding. Besides the work done at the Materiel Division, there are five moving picture cameras in the service which aid in supplying pictures for the Information Division.

German Aviation Training

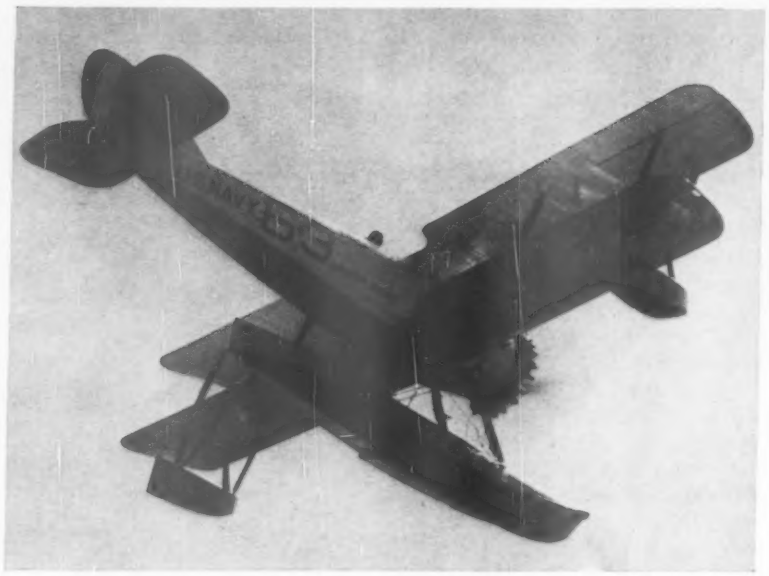
According to the magazine, Luftfahrt" there are thousands of young red-blooded Germans who would like to fly an airplane. In order to meet the wishes of at least some of these men, a program is being launched by the German Union of Air Traffic (Deutscher Luftfahrt Verband). In one of its local organizations, in Essen, a one-year course has been arranged in which the students study the theories of air and weather observation, map reading, airships, airplanes, gliders, flying machines, design, construction, and motors. To this work is added practical exercise in the design and construction of airplane models of different types, and then there are competitions for the builders.

This work is given theoretically because of the small number of aviation schools for giving practical instruction. The course is given in both semesters of the school year, one afternoon each week. At the close of the second semester a theoretical examination is given, after which a diploma and admission to a practical aviation course are awarded. This Essen plan is being introduced into many of the German local aviation organizations.

Training is then continued, in a practical way, in one of the few and good aviation schools. After a license has been obtained, the aviators are urged to keep in practice. For this purpose airplanes and gliders are recommended for purchase by each local organization.

Shipboard Fighters

By Andrew R. Boone



Catapulted plane from U. S. Oklahoma in flight.

IMAGINE row on row of fighting airplanes, observation planes and gunnery planes rising majestically and in uniform ranks from battleships steaming at sea; imagine them sailing skyward like shot from guns and speeding hurriedly on to their missions of finding enemy ships of war and radioing back information of maneuvers; imagine them returning safely to their steel-jacketed havens like doves coming home to their nests.

This procedure, now unknown, soon will become commonplace in American naval annals, for during the forthcoming Pacific fleet maneuvers off San Diego seaplanes will be catapulted in scores, shot into the air by powder and compressed air.

Clarence Chamberlain's exploit of sailing a commercial airplane from the deck of a transoceanic liner in the Atlantic to New York, now an historic incident and achievement, will become commonplace when the navy begins catapulting in a wholesale way. Where his plane left by its own power from a deck, the navy planes will shoot from a 50-foot runway, attaining a speed of 50-miles-an-hour in that distance.

The navy will place the planes on battleships as the most modern adjunct to warfare. In this recognition by naval authorities of aircraft as a naval offensive and defensive weapon, men of the sea for the first time abandon the premise that only battleships can keep an enemy from invading the United States shores.

Just as infantry attacks in waves, the planes will leave the battleships in waves. By prearranged plans, the first wave of fighting planes will dart outward simultaneously from as many goliaths of the navy as may be in a given fleet. They will assemble immediately at an arranged point above the ocean, climb into the clouds and be on their way. Following the battle planes, which will be equipped with machine guns and other weapons of war, the service planes—observation and gunnery direction—will depart.

Old fashioned powder, improved by constant experiment for this purpose will be used in two of three catapults to be placed on each battleship, while compressed air will power the third. These machines of propulsion are not the overnight development of an individual brain, but come as the result of nearly 13 years' work by the navy looking toward their perfection. The Naval Bureau of Ordnance, which has among its duties the designing of catapults, has completed drawings for the new ones and construction will start in the near future.

The navy already has mounted two catapults of the new system on ships of the line, one powder and one compressed air. The powder-charge catapult is fixed to the third turret and is faced into the wind by turning the entire turret. The compressed air apparatus is on a turntable and may be revolved freely and independently of the ship's armament.

No longer do navy officers whose lives have been spent learning principles governing sea fighting with ships hang closely to old theories. They now accept the catapultic principle of releasing heavier-than-air craft for battle uses by these mechanical means as a vital factor in fleet operations. Some believe that under actual war conditions this system will prove more efficacious than releasing planes from the aircraft carriers, since the broad deck expanses of the latter are more vulnerable to enemy fire and can be disabled more readily.

The airplane carrier presents a wide and long deck to an enemy airplane. On the U. S. S. Lexington and Saratoga, now being completed, this space measures 900 feet, a considerable flying field to send to sea. On the U. S. S. Langley, Uncle Sam's only carrier now actively operating, on the Pacific coast, it is particularly vital that the deck remain undisturbed because of its relatively small size and because of the secret gear it contains to aid the planes in stopping.

Under war conditions, it has been suggested, the carrier might be held at some safe point back of the battle line and used as bases and repair ships for the planes. This arrangement would insure safety for reserve planes and speedy aid for those disabled. The effectiveness of enemy bombing operations thus could be minimized.

The catapultic principles go back to the times of Troy. Ancients employed them to toss heavy stones and flaming masses into protected citadels. Nor had modern scientists advanced materially when first catapults were tried out by the navy 13 years ago. In 1914 and 1915 relatively crude cata-

pults were mounted on the then existing North Carolina and some other experimental ships. These operated by motors and counter weights and were only distantly related to the efficient machines now used.

While the scheme for propelling airplanes into the air works well, none has yet been devised to permit planes to land on battleships. Some experiments have indicated that they can "pan-cake" on restricted platforms, but these have not shown adequate safety for personnel and equipment.

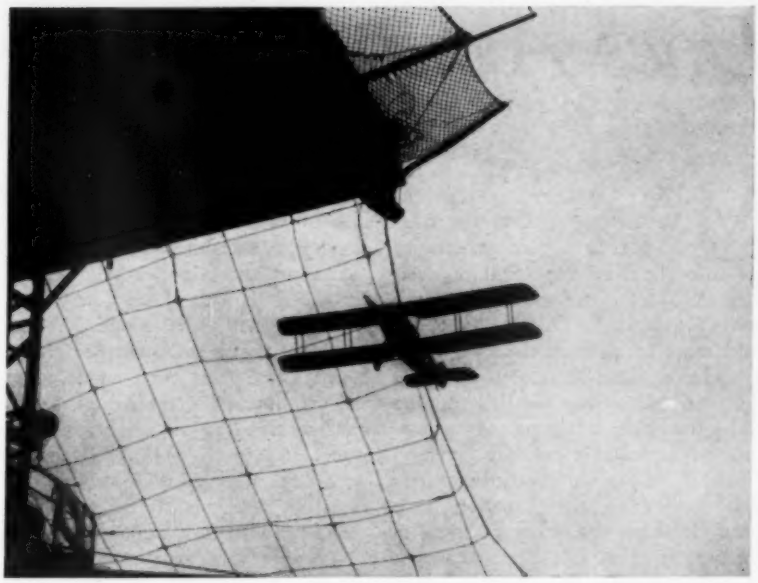
Those planes catapulted are sea planes. Since these must land in the water, equipment is carried by the battleships to hoist them again to the deck. Land planes take off from and land on the carriers just as from any flying field ashore.

Some of the navy's seaplanes are too heavy to be catapulted. Necessarily these arise from and land on the water. Experiments with the powder type catapults have proved that medium heavy planes may employ them for take off purposes. Two types especially, the Martin MO observation and the Loening amphibian, are shot from the powder catapults. Smaller combat planes can be started from either type.

Where the third catapult will be mounted is problematical, but the opinion of sea officers indicates its probable placement on the second turret, where it will operate over the lower forward turret just as the powder catapults now mounted operate over the aft lower turret.

After the first three waves have departed the ships, reserve craft will be mounted and made ready for immediate action. The air personnel of battleships has not yet been determined. How many planes will be considered "standard equipment" for battleships has not been decided upon. Some line officers believe the number probably will be five, permitting two reserve planes of the necessary types.

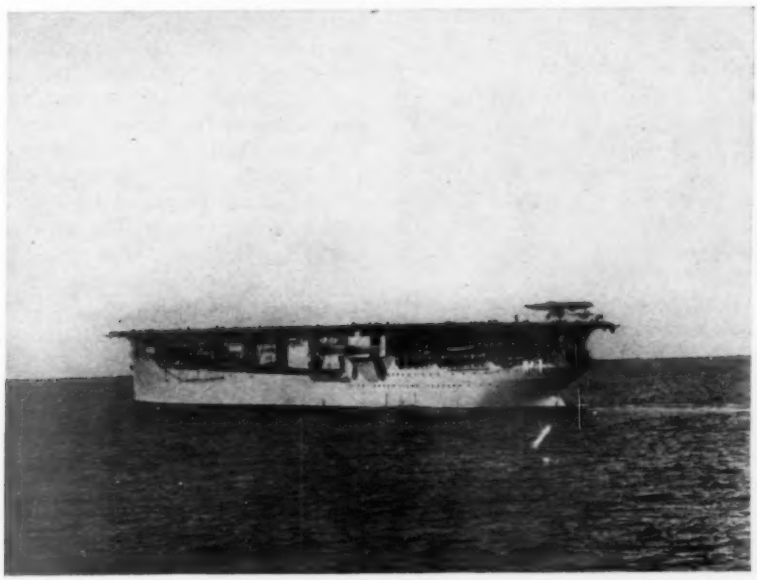
Should a naval engagement move rapidly, it is possible the reserve planes never would take off, as firing from the turrets under battle conditions would keep them too busy to permit the aircraft an opportunity to be mounted and get under way.



Land plane about to alight on Langley. Note arresting device between wheels.

The fleet can make two uses of the first waves. They can be employed to search out the enemy, or, once the enemy is sighted, be released to report his positions and beat back enemy planes. Some think that the commander-in-chief will order all aircraft aloft immediately the presence of the enemy becomes known, the reserve planes being mounted immediately for use. Thus the entire aerial force could serve as the fleet eyes even before the battle starts.

As operated at present, the catapulted planes take the air like a covey of birds, an entire squadron rising majestically and seemingly from nowhere. Immediately they form into a predetermined flying pattern and fly thereafter under command of the squadron commander who radios orders from the flagship.



Landing on the Langley. Deck is cleared and men are standing in nets.

Spain Develops Aviation

The following airports are in service or under construction in Spain: Madrid, Sevilla, Valencia, Alicante, Malaga, Burgos and the Canary Islands. The Spanish Government develops the airports; it furthers the development of aviation also by maintaining a weather forecast for aviators and a wireless service.

Does Aviation Hold a Future?

By Theodore Walliser
Aviation Service & Transport Co.

MANY aviation enthusiasts have approached me time and time again anxious to get into the lure and thrill of aviation. What are the money possibilities of aviation? This thought has held most of these enthusiasts back. They have asked, "Suppose I do spend the time and money for this training and knowledge, will it be only to find this widespread interest in aviation has been only a temporary boom?"

In reviewing the situation very carefully from the point of view of the young or middle aged man who is really sincerely interested in taking up a vocation, I have concluded that aviation opens a real opportunity.

Analyzing the last report of the Domestic Air News of the U. S. Department of Commerce, I find a total of 3,124 applications for pilot's licenses have been filed and a total of only 2,451 applications for mechanic's licenses filed. How many of these applications have been granted the report fails to disclose, but even assuming that at least 90 per cent of them have been issued, the shortage of qualified pilots and mechanics is very self-evident. It is reasonably estimated that there are over 5,000 commercial airplanes in operation throughout the country.

From the reports that I can secure, I find that a majority of the manufacturers of airplanes and aircraft motors are back a few months in the delivery of orders upon which cash deposits have been made. From an approximation of the number of orders on hand, it is reasonable to assume that these total over 4,000 planes. Add to this figure the enlargement for increased production that the majority of manufacturers are planning and you will find that better than 10,000 planes will be sold during the coming spring and summer season. From a survey of students in attendance at the various resident flight training schools, there are approximately only 3,000 men taking up the ground course and flight training, which knowledge becomes absolutely essential to meeting the requirements for either transport or limited commercial pilot's license.

The estimate of 10,000 qualified trained men being needed by next summer, which has been made by competent authorities, I believe is actually less than the facts justify. It is conceded that every plane in active operation requires about eight ground men. These men being made up of the manufacturers, mechanics, airport managers and airways lighting supervisors and controllers. The range of possible earnings in these various positions can be likened to either the automobile industry or transportation in-

Theodore Walliser

dustry of this country, with this exception—the minimum that a licensed mechanic will received will probably range from $50 per week upwards. In fact a number of the airports of the country are establishing a standard charge for airplane ship mechanics and aircraft motor mechanics of $2 per hour. From a minimum return of possibly $50 per week, there is really no limit as to what earnings should be.

It has been calculated that for every hour in the air in service, the air mail pilot receives about $18. I have been to some of the local fields where passengers were being carried on local hops and have seen local pilots make from $150 to as high as $300 per day. A man can start cashing in on his aviation training as soon as he is qualified for a license as a mechanic. Such earnings can be increased later by his meeting the requirements for the limited commerical or industrial pilot's license which calls for fifty hours in the air.

Aviation can be likened to both the automobile industry and the transportation facilities, such as the railroads, bus lines and the boat lines. Its possibilities are as great as all of these lines put together. In fact, a number of the railroad companies are considering the proposition of a combination air and rail haul as the New York to 'Frisco run can be shortened two days as compared to the all-rail haul at the present time. The savings on emergency trans-water voyages would be so great as to have a decided determining factor in favor of the air transportation. Air transportation is not a fad, fancy or craze that has popped up into existence since Colonel Lindbergh's non-stop flight and other famous flights. It is the result of a combination of years of engineering skill and experiments. When we realize and talk about a 3,000-mile non-stop flight it actually means a great deal in comparison with what railroad, automobile or steamship lines are able to accomplish.

The one thing that can possibly be holding aviation back is the greed of the newspapers for anything that they can play up as sensational news. If a fair comparison was made of the accidents between the airplane and the automobile, the conclusion would be that the airplane is the safer conveyance. Aviation has arrived and will stay as one of the permanent modes of travel, mail and express carriers. This industry will find a widespread demand for capable executives to function in its development. The mechanic and pilot will always find a competent and possibly more substantial reward for his services, which will be stabilized and certified to through his ability to qualify under the U. S. Department of Commerce license. This is probably the first time in the history of the country where trained men in a certain industry have had the opportunity of having their ability to function properly certified.

The recent conference at Washington by the U. S. Department of Com-

merce licensing and qualifying the flight training schools will go a long way towards establishing standard requirements on the part of the training organization for the production of the industry. With such standardization the prospective student can easily satisfy himself as to the standing of an organization from whom he desires flight training.

The recent conference at Chicago of the mayors of many cities of the country for the establishment of airports and landing facilities will give local aviation in the various cities a wonderful boost.

The offer on the part of the Park Commissioners of Chicago to spend $5,000,000 for an improved airport right off the lake front of Chicago is significant of the attitude of the present business man.

It takes time to train, and if 10,000 men went into training today, it is my candid opinion that by the time they were thoroughly trained in aviation they would find at least two jobs for each man.

Bombing Practice

THE recent bombing of the Pee Dee River bridge in North Carolina by the Army served to emphasize the effectiveness of high explosives in the destruction of such permanent installations as bridges, roads and arteries of traffic. Several years ago there was constructed across the Pee Dee River a bridge built of reinforced concrete embodying the very latest ideas on this type of construction. This bridge was built to withstand the severest strains and stresses to which construction of this type could be subjected. It was 20 feet in width and approximately 1,000 feet in length and consisted of three huge spans across the river and seven smaller approach spans on each side.

Seven years after the completion of this structure, modern demands for the creation of a source of power made it necessary to erect a dam on the Pee Dee River south of this bridge at a height which would have resulted in the submerging of the bridge in the lake which was to be created. This necessitated the building of another bridge north of the first one, and at a greater height in order that traffic across the newly made lake might not be interrupted.

The State Highway Commission of the State of North Carolina was directed to destroy the first bridge in order that it might not be a menace to navigation in the lake, and the Commission therefore asked the War Department if the opportunity to destroy this bridge would afford the Department the means of securing data which might be of military value. The War Department accepted this opportunity immediately, and the mission of destroying the bridge was turned over to the Air Corps, the Engineer Corps and the Field Artillery. The War Department was anxious to determine:

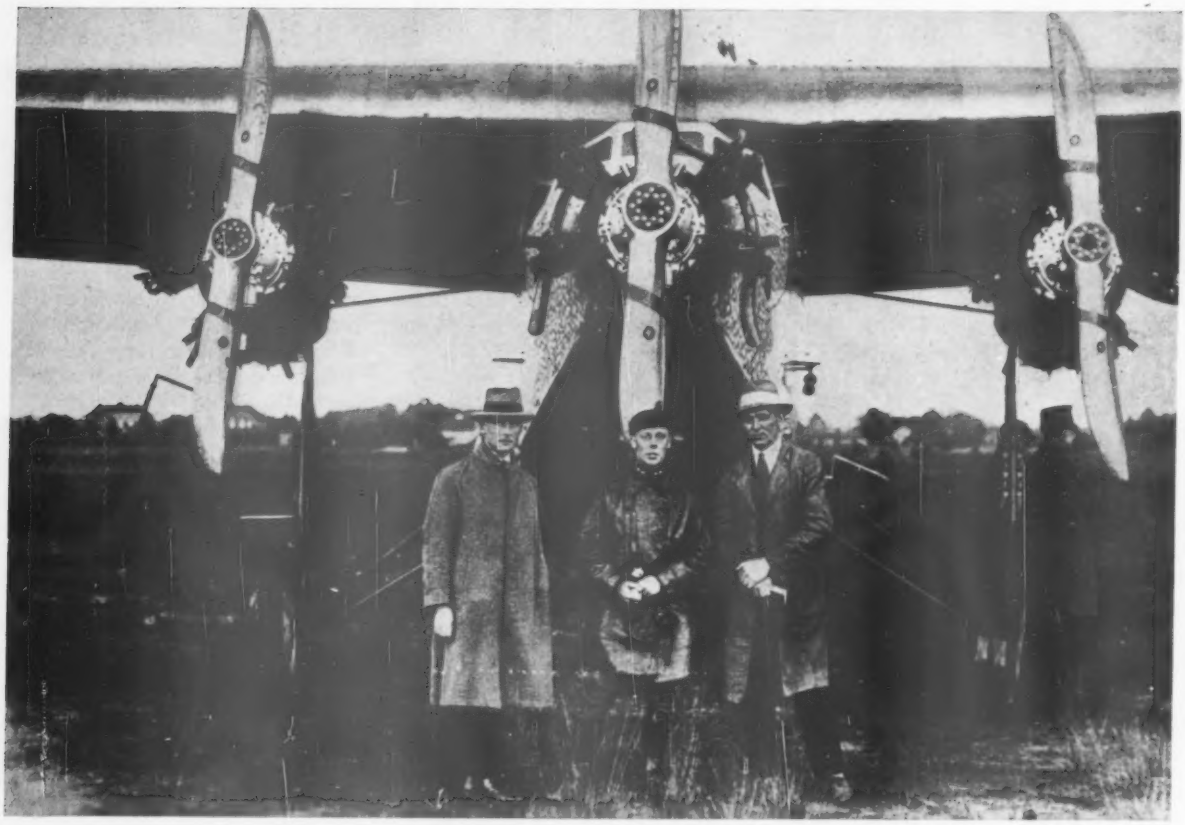
1. Whether the present demolition bomb cases would stand up under impact from high altitudes on reinforced concrete construction.
2. Whether the 300 lb., the 600 lb., or the 1,100 lb. demolition bomb was the proper projectile to demolish such modern construction.
3. Whether in order to accomplish such destruction the bombs should be fused with detonators to give
   (a) Instantaneous explosion.
   (b) Or delayed explosion.

In order to determine whether or not aerial bombs would fracture as a result of impact on reinforced concrete from normal bombing altitudes it was necessary to fill empty bomb cases with sand and then to secure hits upon the bridge with these bombs when dropped from airplanes. If an operation such as this was conducted during times of actual hostilities these bombs would have been dropped in salvo from airplanes flying in the usual offensive and defensive formation of about nine planes. With such a formation it would not be very difficult to place the center of impact of the salvo on the bridge insuring a hit by at least one or two bombs. This method of procedure, however, was not possible during the Pee Dee River test in view of the fact that it would have entailed a certain hazard to occupants of the country adjacent to the bridge. For that reason it was necessary to carry out the tests with single airplanes or with a formation of not more than three airplanes. This greatly decreased the possibility of actually hitting the bridge.

"A" is a portion of bridge assigned to Air Corps.
"B" shows damage by three 1,100 pound bombs, and "C" the damage by one large bomb.

The minuteness of this target as

(*Continued on page 78*)



Pilot Fryns, Lieutenant Koppen and Mechanic Elleman with the Fokker tri-motored plane used in Batavia trip.

K. L. M. Service

ONE of the first things that strikes the air traveller in Europe is the volume of printed matter available concerning air travel. Elaborate maps and time tables as well as promotion matter of the highest class are issued by the companies operating the various air lines.

The Koninklijke Luchtvaart Maatschappij (Royal Dutch Airlines) or K. L. M., as the name is commonly abbreviated, operate lines radiating from Amsterdam to Paris, London and Hamburg. The cover of one of the pieces of publicity issued by K. L. M. is shown in the illustration, which, unfortunately, cannot reproduce the striking appearance of the printing which is in black and red. The booklet is printed in English and is a rather striking sales talk on aviation. It reads as follows:

TALKING OF SAFETY—
DO YOU KNOW?

That the K. L. M. (Royal Dutch Air Lines) has had SIX YEARS continuous experience of operating Air Routes, and that safety in flying has ever been the first consideration of all concerned.

That this experience is at the service of the travelling public.

That the "Fokker" Monoplane, as used by the K. L. M. has a world wide reputation for flying qualities and reliability.

That all K. L. M. Aeroplanes are fitted with British Engines, which are the most reliable in the world.

That Mr. Anthony Fokker himself demonstrated safety in the Air with one of his commercial Monoplanes at Croydon in April, 1925, before the heads of the Air Ministry and of the Aircraft Industries.

That on this occasion Major Gen. Sir Sefton Brancker, Controller General of British Civil Aviation occupied the seat alongside Mr. Fokker in the Pilot's cockpit.

That the reliability of the "Fokker" Monoplane was further proved when Lieut. J. van der Hoop flew one of these Aeroplanes taken off the London—Amsterdam Air route for the purpose) from Holland to Batavia, in Oct. 1924, a distance of more than 12,000 miles.

That a total of 20,000 passengers have travelled by K. L. M. Air Lines.

That not less than 14,000 people have made Joyflights in K. L. M. machines.

That all K. L. M. Aircraft are signed for as safe in all respects for the journey, by a fully certificated Engineer before leaving an Aerodrome, and that besides this, the Aeroplane has to pass the Pilot's tests before being approved by the Station Manager for the Flight.

That the Pilots are in constant touch with their terminal Aerodromes throughout the journey, by word of mouth, as every Cross Channel machine is fitted with Wireless Telephony.

That the K. L. M. Pilots are the pick of the Dutch Air Force, and that they act as auxiliary Pilots on the Air Routes during a period of training before themselves piloting a K. L. M. Aeroplane.

That 90% of the Pilots are married men, who do not consider flying at all a hazardous profession.

That British, as well as Dutch Insurance Firms have placed Flying by K. L. M. Aeroplanes on the same footing as travel by all other accepted modes of transport.

Maps are issued by K. L. M. in strip form, folding compactly into a booklet fitting the pocket. The various routes, Amsterdam to Paris, Amsterdam to Hamburg, and the other scheduled routes are each covered by a separate map, and tiny marks in the shape of planes on the map show points of interest. On the margin of the map is given a brief description of the interesting places.

K. L. M. not only operates European lines with regular scheduled runs, but have a taxi service which is available for trips of any length. Mr. Van Lear Black, Baltimore publisher, made what is perhaps the longest taxi trip on record when he chartered one of the K. L. M. Fokker F. VIIA type planes for a trip to Batavia and return. Mr. Black had been using this machine for European flights totalling over fifteen thousand miles.

The plane was one of the type used on the regular passenger runs and when not in use by Mr. Black was flown on the regular service of the Royal Dutch Airlines. The only change made was to increase the fuel capacity somewhat in order that non-stop flights of over 1,250 miles might be made.

Mr. Black's trip to Dutch Java took sixteen days. One whole day was spent in Constantinople and two days in Bagdad. The trip itself occupied 86 flying hours.

An average speed of 105½ miles per hour was maintained for the trip, a fine performance considering the fact that this was an ordinary commercial craft with five people on board and weighing 7,938 pounds. The entire trip, including the return passage took 183 hours and 27 minutes of flying time and covered a total distance of 19,184 miles, which is an average speed of 105 miles per hour.

More recently the same trip was undertaken by Lieutenant Koppen of the Dutch Army Air Service, with two passengers in a Fokker F-VII Trimotor, powered with three 180 horsepower Siddeley Linx engines. This trip took but ten days, nine of them being used for flying.

This trip was not a stunt performance but was conceived and carried out as a pathfinding flight for the proposed air mail service between Holland and the Dutch West Indian colonies.

(*Continued on page* 82)

The Saratoga Commissioned

UNCLE SAM has a new ship—the largest, fastest and most modern airplane carrier in the world.

When the U. S. S. Saratoga was turned over to the Navy Department in November by the American Brown-Boveri Electrical Corporation, of Camden, N. J., the aviation industry turned its eyes to the ship's unique equipment.

For the Saratoga is an amazing craft. It has a two-acre landing deck. It has so many machine and wood-working shops that a complete plane can be built on board. And it has a secret catapult and a secret arresting gear that can bring any plane to a stop on its broad landing deck within four times the plane's length.

The new ship is capable of carrying eighty-three pursuit, reconnaisance and bombing planes in its storage rooms and on the hangar deck. The planes can be raised or lowered to and from the landing deck by electric elevators. The planes, officials say, can take off in any kind of weather.

A new device—the mechanism of which is a carefully guarded Navy Department secret—is the arresting gear, which can bring a plane landing on the main deck to a dead stop within 150 feet. The second secret is a specially constructed catapult, by which seaplanes can be hurled into the air, one after the other, when the sea is too rough for an ordinary take-off on the water. Photographers who have attempted to take pictures of the arresting gear and the new catapult have been politely informed that pictures of the two devices are taboo.

The Saratoga has none of the symmetrical bulk of the dreadnaught, with towering masts and bank on bank of jutting gun turrets. Her heavy armament consists of eight 8-inch rifles, mounted on twin, enclosed, armored gun turrets, fore and aft of the funnel enclosure.

On both sides of the hangar deck, which houses the planes just below the landing deck, are twelve 5-inch anti-aircraft guns, their sullen, brass-ringed muzzles pointing inquisitively toward the skies. The ship also has four single, abovewater torpedo tubes.

The Saratoga's armament alone is evidence that she is not a clucking, defenseless brood-hen for airplanes. Combined with her armament she has a speed greater than that of any ship afloat, generated by four 35,200-kilowatt generators and driven through

her four 2-foot propeller shafts by 180,000 shaft horsepower.

The world's largest airplane carrier has a speed which can be maintained for an indefinite period at 33½ knots per hour, or almost thirty-eight miles per hour. The ship could leave Boston at any given hour and arrive in the harbor of Cherbourg, France, three days and twenty-two hours later—lowering the existing record for the trip by thirty hours.

Faster than any liner now ploughing the high seas, faster than the swiftest of Uncle Sam's super-cruisers —which are the fastest in the world —the Saratoga could laugh at any naval engagement simply by leaving it.

The mighty ship appears like some antediluvian sea monster with its strange, flat deck, its enclosed funnel tower on the starboard side and its peculiarly-shaped stern, jutting out like the ram of a Roman war galley. The ship is massive in size, the landing deck extending 885 feet over all in length, 106 feet in breadth and 74 feet from keel to landing stage.

Not the least of the Saratoga's features are her foundries, her machine and repair shops, her woodworking plant—in fact, everything to meet the demands of a modern flying service. It will be possible to build a complete plane without the builders leaving the ship.

The ship has two main decks—the landing stage above and the hangar deck below. The four 60 by 30-foot electric elevators for lowering planes to the hangar deck have been constructed so that their tops are flush with the landing deck. Nothing has been allowed to disturb its unbroken smoothness for takeoffs and landings.

According to experts, landings and takeoffs may be accomplished in any but the most impossible weather by virtue of the fact that the ship, unlike the earth-bound flying field, can be headed into the wind. Under favorable weather conditions, seaplanes will be lowered overside to the water by a crane, situated just forward of the starboard gun turret.

The Saratoga is a city within itself. The power generated by its engines is sufficient, according to navy engineers, to supply the entire city of Boston. The ship has cost approximately $40,000,000. Her construction, which has taken place over a somewhat hectic period of ten years, was begun under the design of a battle cruiser, but the Washington Arms Conference forced her to seek a divergent destiny as a marine flying station. Under ordinary conditions the crew will consist of 1,900 officers and men, which will be increased to a war strength of slightly in excess of 2,100.

To counterbalance the starboard weight of the turret enclosure, a cargo of oil and fuel is being carried in compartments on the port side. As they are emptied, they are filled again with water as ballast. The ship displaces 33,000 tons.

A powerful radio transmitter, multiple speaking tubes by which messages can be flashed instantly to all points of the vessel, power rating and range-finding devices are other features of the Saratoga's equipment. The crew are men with aviation ratings. Captain Harry Erwin Yarnell is commander and Commander Kenneth Whiting is executive officer of the aviation section of the ship. During the war Whiting commanded the U. S. Naval Air Station at Killingholme, England.

The Navy has received generous increase in the appropriations now before Congress for its aeronautic program. It is particularly gratifying at this time that the many experiments being carried on will not have to cease for lack of funds.

A sister ship to the Saratoga—the U. S. S. Lexington—has been completed in the yards at Quincy, Mass., and will take her place with the scouting fleet. The Saratoga will join the fleet on the Pacific coast in February.

The Langley, the navy's other airplane carrier, lacks the modernity of the two latest carriers, but is now in active service.

The use of airplanes for ship-to-shore flying to cut down the time of passage of mail and passenger will be an accepted feature of trans-oceanic flying within two years. By that time every liner will be equipped with catapults necessary to launch planes. The development of speed-arresting devices to enable planes to land on liners' decks is but a matter of time.

These are the predictions of Commander Kenneth Whiting, U. S. N., who has supervised outfitting of the mammoth aircraft carrier Saratoga, at the American Brown-Boveri Electrical Corporation, Camden, N. J.

Commander Whiting, who is executive officer of the Saratoga, has had considerable flying experience, but he is interested more in the development and experimental phases of the work, he says.

He criticized the many recent long-distance flights as "stunts" and declared that aviation's greatest hope lies in the carrying on of experiments to overcome its two greatest obstacles, weather conditions and initial expense. When the problem of weather is solved, long-distance flying will follow as a matter of course.

The dangers of flying through fogs are lessening with the development of devices such as the "radio beam" and the radio compass. A successful flight through fog, with the take-off and landing both veiled in a heavy haze was made recently.

Commander Whiting pointed out that during the years of experimentation by the United States Navy, more than 4,000 shore-to-ship flights or vice-versa have been made, with "not a bone broken," although several planes have been wrecked. All of the navy cruisers and battleships are being equipped with catapults.

The 100-mile flight of Clarence Chamberlin, trans-Atlantic flyer, from the Leviathan to shore in 75 minutes, last summer, points the way to a regular service of this type, according to Commander Whiting. Chamberlin did not use a catapult, but took off from a 114-foot runway. His craft lifted at 75 feet.

Following the Chamberlin experiment the United States Lines made plans to organize a ship-to-shore service on all its vessels. Equipment for this purpose is to be installed on six liners by spring.

"The catapulting of planes from ships at sea will cut down mail delivery time by more than a day," Commander Whiting said. "A ship off Halifax, for instance, could send its mail to New York by air in about six hours, beating the ship's time by a day. A similar saving could be made on the other side of the ocean.

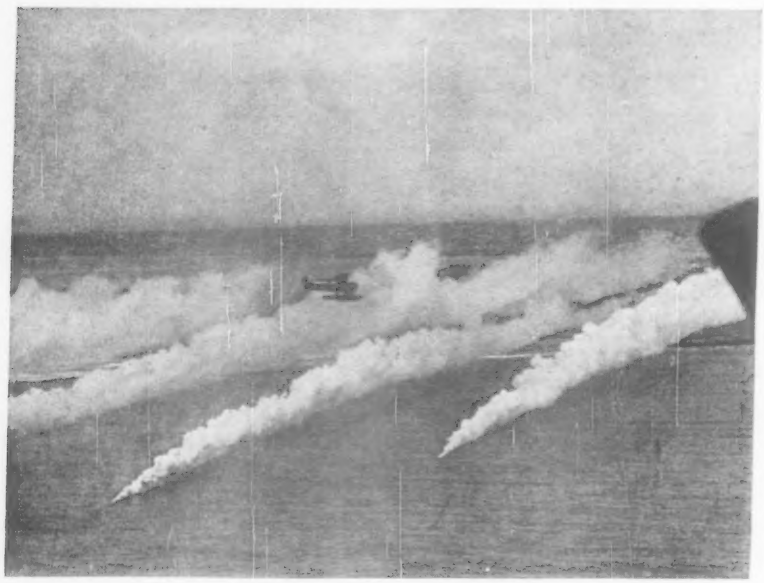
"The navy has proved that planes can take off from vessels in any kind of weather, except when waves are breaking high over the ship. An air-

plane cannot be catapulted successfully into heavy spray.

"It is feasible also to drop heavy bags of mail on outgoing ships while they are at sea. It is true that an attempt to drop mail on the Leviathan ended in failure, but this was because of fog conditions. The dropping of messages on war vessels by aircraft is an accepted practice of the navy."

Although the take-off of airplanes from vessels practically has been solved by the development of the catapult, the naval officer admitted that the landing of planes on liner is still a problem.

"There is the question of stopping a plane within a short distance, and of clearing enough space on the deck to permit a safe landing," Commander Whiting explained. "The most outstanding technical obstacle to be overcome is in the air eddies set in motion by the funnels and other objects on the decks."



Experiments are now being conducted to devise retarding aparatus to aid in bringing planes to a halt on ships' decks. Commander Whiting is confident that such devices will be developed soon.

The successful landing of an airplane on a ship was an accomplished fact years ago, he added. A naval plane landed on the old armored cruiser Pennsylvania in 1911, and then took off from the ship. This followed the first successful ship-to-shore flight in 1910, when a navy pilot flew to shore from the U. S. S. Birmingham in Hampton Roads, a distance of five miles.

By 1916, the N. S. Navy had four ships with catapults. The catapult was not used in the war, Commander Whiting said, because the take-off of planes would have interfered with firing of guns on the vessels. Great Britain had one such ship in the war.

Since the war the navy has conducted extensive experiments in catapulting of airplanes. This country now leads the world in development of the catapult, with Great Britain close behind. France and Italy have outfitted a few ships. Japan has begun to take interest in this phase of aviation. Great Britain has concentrated on hydraulic catapults, whereas the United States has developed the air pressure and gunpowder types.

Discussing the many recent long-distance flights, many of which have had fatal endings, Commander Whiting characterized them as "stunts" and declared that they serve no useful purpose.

"Some day the Federal government will step in and inspect every plane rigidly, just as it now regularly inspects every steamship," he continued. "It will forbid flights where the planes are not considered capable of the proposed flight. This will cut down fatalities.

"At present, however, it is best not to make rigid restrictions. There must be a clear field for all sorts of experimentation."

He refused to commit himself on the feasibility of establishing moorages on the surface of the sea as landing stations for trans-Atlantic air liners.

"It all depends on whether the stations can be moored to the bottom of the sea," he said. "This becomes quite a problem when one has to moor a floating dock at a point where the ocean bed is a mile or more below the surface."

Trans-Atlantic flying would not be successful at present, he asserted, because there is no demand for such service. The great mass of trans-oceanic voyagers are not yet ready to trust their lives to airplanes for long-distance flights of this kind.

"Flying over long stretches of sea must await development of the seaplane," he continued. "A land plane, such as has been used in recent distance hops, has very little chance when it is forced down. It has only the buoyancy of empty gasoline tanks to keep it afloat.

"It was a seaplane in which Commander Rodgers kept afloat nine days when he was forced down on his flight to Hawaii. A seaplane is built to keep afloat. But it is also heavier than a land plane, and so cannot carry as heavy a load. Aviation research men are now working to make the seaplane lighter.

"The problem of weather conditions is absorbing the attention of aircraft experimenters, and fog will soon be conquered. There is the radio compass, which was used by the army flyers, Maitland and Hegenberger, in their flight to Hawaii. The compass has not been fully developed and can be used only within 500 miles of radio broadcasting apparatus.

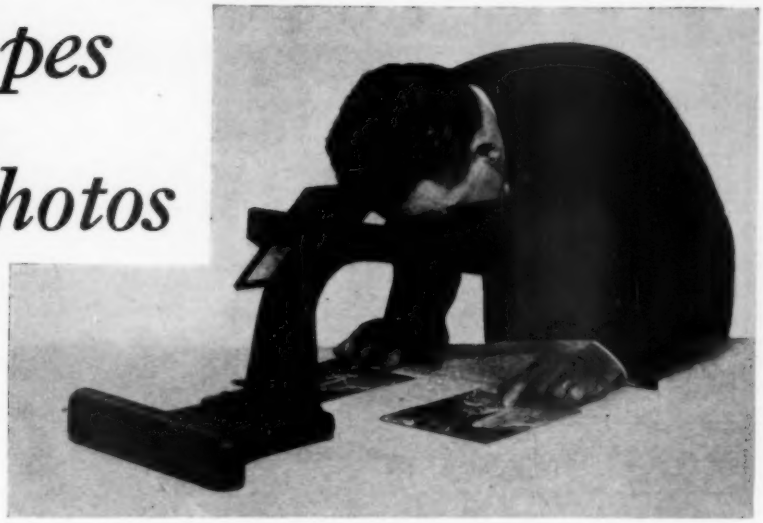
"The 'radio beam' is a device which shows by flashing lights whether the pilot is on or off his course. When he is on his course a white light flashes. A deviation to the left or right brings a red or green flash, and the pilot turns his plane until the white light shows again.

"The greatest danger in fog flying is to keep the plane from going into a tail spin. The aviator has only the horizon to tell him whether he is flying parallel to the ground. In fog he cannot tell whether his plane has pointed its nose up or down. He may go into a fatal tail spin before the automatic devices on his instrument board react to the change in position."

Stereoscopes and Aerial Photos

By E. W. Fuller

Chicago Aerial Survey Co.



The stereoscope used for bringing aerial photos into relief.

LOOKING for the first time at aerial photographs through the stereoscope gives the eyesight a new and unexpected experience. Every detail comes slowly and gently into sharp and perfect relief. The stereoscope transforms the flat photograph into an actual model of the reality. Buildings stand up like tenpins. Hills lift their bulk up at you and the trees untangle themselves and rise in a way that assures you that it would be possible to walk beneath them. If there happens to be a bridge crossing a stream in the picture you will want to run your finger under it.

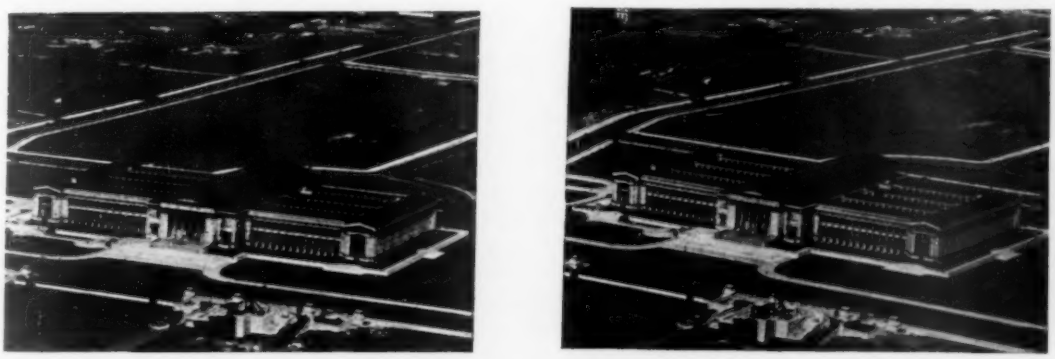
When the stereoscope was invented in 1838 photography was an undiscovered art, and the instrument was used in viewing geometrical drawings of solids. In 1849 Sir David Brewster, to whom the science of optics is greatly indebted, made a much improved stereoscope, bringing it into popular use and quickening the development of stereoscopic photography. It was to no less a mind than the great Oliver Wendell Holmes (in 1861) that we owe the handy and much used type of stereoscope which was as familiar as the clock in the household of a former generation.

The stereoscope used for inspection of aerial photographs is slightly different and larger, making use of mirrors to reflect and concentrate the two different images.

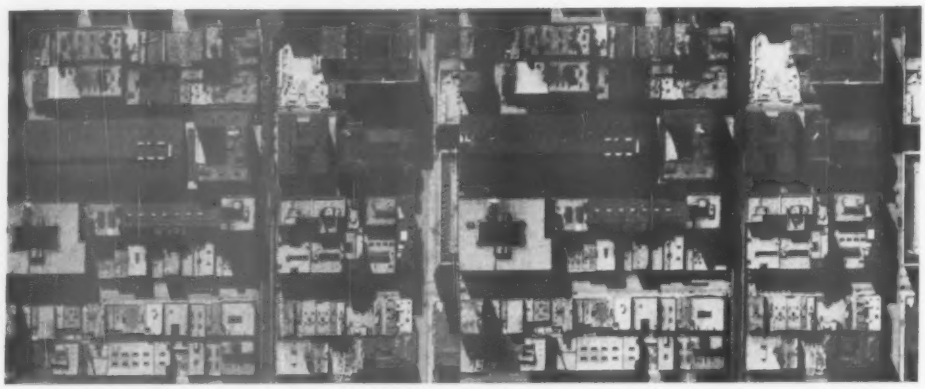
In looking at any object, each of our eyes sees a slightly different view of it. The brain resolves these separate images into one. The stereoscope utilizes this theory. Two pictures of an object are made, one corresponding to the image seen by the right eye if the left eye were closed, and the other to the image seen by the left eye if the right eye were closed. These two similar but not precise pictures are put under the stereoscope, which is so arranged that the right eye sees only one of them and the left eye sees only the other. The brain resolves the images into one, giving the result of depth, the same as if the object itself were being looked at instead of merely flat pictures of it.

As entertainment and phenomena of vision, the stereoscope seems to have passed out of fashion along with bicycles, fine handwriting, etc., but its merit still exists in technical uses and its value in the engineering uses of aerial photographs is very great.

In the first place, it makes all detail in an aerial photograph more clear and the identity of an object, which might be obscure on the flat photograph, becomes more easily determined when the stereoscope gives that object its third dimension and proportionate size among the other objects in which



Mount this picture on a card, trim to fit an ordinary stereoscope and you will see the buildings in relief.



Mount this picture on a card, trim to fit an ordinary stereoscope and you will see the buildings in relief.

it stands. In the next place it allows the engineer to get the elevation or contours of an area of ground—data, of course, of primary value in surveying. Practice in its use enables the observer through the stereoscope to become very accurate in actual determination of the depth of valleys, the height of hills, etc.

To provide suitable photographs for use under the stereoscope, it is simply necessary to make the series of map exposures with about sixty per cent overlap. In this way any two views in sequence have in common sixty per cent of the ground covered by both negatives. As nearly all aerial mapping is taken with about this much overlap, to avoid skipping, etc., as explained in a previous article, the exposures made for any regulation map are automatically suited to use with the stereoscope.

As an illustration, assume that a proposed right of way for a railway is being surveyed from the air. Say is it intended for a short cut expected to straighten out a wasteful zig-zag and is about twenty miles long. The flying is done at an altitude of seventy-two hundred feet with a twelve-inch lens camera, so that the resulting scale is six hundred feet to one inch. Taking the exposures at intervals with a sixty percent overlap would mean that about sixty-five negatives would be made. Now, as the engineers wish to see how the terrain varies from the level and what they would have to contend with in the way of making fill-ins and cuts to establish a roadbed, they would take the series of prints, starting with number one from either end. They would put numbers one and two under the stereoscope for observation first. Next, they would use numbers two and three together, then numbers three and four, and so on. Thus the whole route, without missing a single foot, can be studied—its entire contour and all its topographical characteristics clearly revealed.

Brief European Impressions

By F. D. Mayer

Vanderhoof & Company, Chicago

HAVING just returned from a three and a half months' trip through Europe I have had an opportunity to compare air travel abroad with that in this country, especially from the standpoint of the business traveller.

In the first place, flying is an accepted thing in Europe, and it is not at all unusual for a business man in London to be talking by telephone to another business man in Paris, and for them to arrange a business appointment in one or the other city within three or four hours.

The man in Paris can hang up his receiver, at eleven thirty, drive out to Le Bourget, and be in London at three o'clock. Here's an experience I had. A friend took breakfast with me in London and stated that he had to go to Paris on business, but would try to get back in time to have dinner with me that same evening. He left London at nine o'clock, arrived in Paris at twelve, left Paris at three, and was back in London at six and we dined together that evening.

One can fly all over Europe, and the planes run on absolute schedule. The type of planes used are for the most part, eight to ten passenger, three motored planes. The routes are very carefully laid out and flyers maintain altitude and speed standards or schedules as laid out by the traffic division. Nothing is left to the pilot's own discretion or judgment. Planes are very comfortably equipped with cushioned chairs, toilet facilities are available, and there is a regular service now maintained between Paris and London and vice versa where luncheon is served.

Custom regulations are very quick, courteous and efficient. Passengers arriving at Croydon, London, from Paris are through the customs division in less than ten minutes, and a high powered motor bus is waiting, by which one is whisked to the center of the town.

All the newspapers carry advertisements of the aviation companies who maintain service, advertising this service, and showing the schedule. The aviation companies usually have beautiful offices and waiting rooms in the center of the town and at all the hotel ticket offices and similar places, flying schedules are prominently displayed.

One hears little of accidents and the fields are well kept and fully manned with mechanics and service men, including porters, etc. Lunch stands are

maintained at the important fields as for instance, London, Paris, Berlin, Vienna, etc.

Rates for flying are about the same as first class rail and sleeper fare. The service is pretty well booked ahead, and it would be well for anyone contemplating flying to book his passage several days in advance.

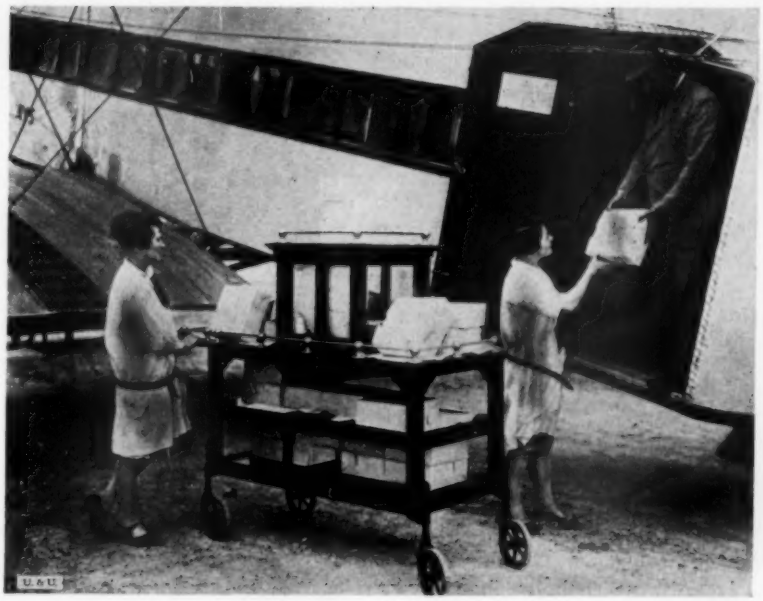
We did a great deal of flying and always found the planes filled to capacity. Baggage is carried in the regular way and even excess baggage can be arranged for by the payment of a small extra sum.

I had my boy with me and two nephews and we had several very wonderful flights. As evidence of how one saves time, let me refer to just one or two instances. From Berlin to Frankfort is a distance of approximately 375 miles. By train, one leaves Berlin at eight o'clock at night and arrives in Frankfort at seven in the morning, after spending all night on the sleeper. We contrast this with our airplane trip. We left Berlin at twelve o'clock one afternoon and were in Frankfort at four fifteen that same afternoon.

From Ostend in Belgium to London means a trip by boat across the North Sea and English Channel to Folkstone. This takes either all day or all night. From Folkstone to London is four and a half hours. We made the trip by airplane in an hour and a half.

We left London at twelve o'clock one noon and at three were in Paris. On this same trip were two business men and four other American tourists, three of which were women.

The service that is maintained is such that all fear is removed. In my party were my thirteen year old son, and two nephews, fifteen and seventeen. All of our flights were made without one thought of fear and certainly no inconvenience. In all the trips we made, we did not once find a passenger suffering from mal de mer (sea sickness). Altogether we made seven flights. In every instance we left exactly on time and arrived exactly on time. I look forward to the day when America will take advantage of her opportunities in aviation. Certainly we are far behind now in equipment and in organization.

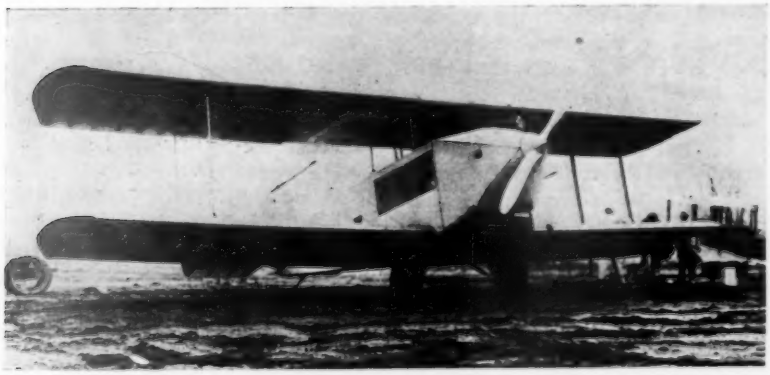


Lunch stands are maintained at the important fields.

Recently I arranged for a friend to make a flight of 400 miles. The plane was scheduled to leave very early in the morning. She arrived at the field, and was advised that the plane would be four hours late in leaving. She came back on the train.

Perhaps one of the most significant things about European aviation is the fact that the government has subsidized the companies maintaining the service and insists on their maintaining very definite, exact schedules, as well as requiring the companies to follow exact courses previously laid out and establishing definite speed and altitude standards.

I would use airplane service in America frequently if I was familiar with the schedules and the schedules were definite. Today though I am much interested in the subject, I have no information on the subject but I presume this is usual with any new project. But we are breaking down the sense of limitation with which we have been inhibited and which has been proven by our neighbors across the water. When America does awaken to the possibilities of this mode of travel, we undoubtedly will take our usual leadership.



British Lines are replacing older equipment with the latest in passenger craft.

Canadian Weather Reports

Three air stations have been established on the Hudson Strait by the government in order to observe and report on weather conditions in that region, reports Trade Commissioner Walter J. Donnelly, Montreal, to the Department of Commerce. Each of the stations has 12 aviators and complete equipment.

Japan to Cross Pacific

Japanese officials at the inauguration of the first commercial line at Osaka.

WHEN Col. Charles A. Lindbergh made his famous flight across the Atlantic, thereby setting the whole world on fire, he also set ablaze the ambition of a nation to conquer the Pacific aerially. In consequence, the people of Japan have, by voluntary subscription, raised sufficient funds for financing a trans-Pacific nonstop flight. This will be the longest non-stop flight yet attempted and is scheduled for July, 1928.

Ever since Commodore Perry opened the barred door to the East the Japanese have kept pace with the progress made by other nations. The successful termination of the trans-Pacific nonstop flight will give the sons of Nippon a place in the ranks of aviation.

Enthusiasm for the coming flight is at fever-heat. Sponsored by the Japan Imperial Aerial Association, of which H. H. Prince Kuni, is president, with Lieutenant General Magako and ex-Minister Baron Sakatani as vice-presidents, the flight has had the undivided support of the entire populace. The sum of 300,000 yen, or $150,000 has been fully subscribed, and a prize of 50,000 yen has also been offered by a wealthy merchant of Tokyo.

Three four-men planes, of the German "Dornier" K-12 type monoplane, equipped with a 600 horse-power motor, and of three and one half tons gasoline carrying capacity are to be used. They are to be flown by Japanese pilots, and manned by native crews, and are a product of the Kawamischi plant at Kobe. One of the planes, completed in December, of last year, is now being used by the Japanese aviators who are trying out their wings in preparation for the coming flight. The second and third planes will be completed in February or March and will be turned over to the flyers.

The purpose of the flight is the furtherance of the now existent friendly relations between Japan and her neighbors across the Pacific, to show the feasibility of flying across the world's greatest body of water, and the awakening of the people of Nippon to the possibilities of aviation. Thus far, the Pacific has only been crossed halfway by aeroplane, in the recent hop to Hawaii. The coming flight, if successful, will be the longest on record and, barring all accidents, it is intended to make the 4,200 miles in 42 flying hours.

The flyers will hop off from Tokyo sometime in July. As yet, the western terminus for the trans-Pacific non-stop flight has been undecided. Japanese consuls at Seattle, Washington, and Portland, Oregon, have made a bid for their cities, but, apparently the matter has been taken out of their hands by Y. Miawa, air attache of the Japanese consulate at Seattle, who has recommended Lulu Island, about 15 miles from Vancouver, British Columbia.

It is only within the last three or five years, that Japan has made any progress aerially. In 1925 she equipped 2 Asahi Loraine-Dietrich 400 horsepower planes, and Japanese aviators flew to Europe by way of Siberia, flying over Moscow, Paris, London and Rome. In the spring of 1927, a plan was gotten under way to start an aerial passenger service, with 3 Dornier-Comets.

At present Japan is served by a single commercial airline between Tokyo and Osaka. However, the Nippon Aerial Navigation Company is planning to open an airline to China with Shanghai as the objective point.

This also holds true of the nation's air mail service which cannot be com-

pared to that of other countries. It comprises three routes with a tri-weekly delivery. They are: Tokyo to Osaka, and Osaka to Fukiwaka, a distance of 300 miles between each city. The third, between Rakai and Imaharu covers some sixty miles.

Civil aviators in Japan receive their flying instruction at thirteen schools, scattered throughout the country. As yet there is no record of ladies of the chrysanthemum having taken to the air, but, like the women in other lands, they are bound to follow.

Candidates for the trans-Pacific flight were chosen from a number of well known aviators, and the selected pilots are shown in the photograph. None of them are over 32 years old. Their names and ages are: T. Fojomoto, 25; M. Kayeda, 23; Y. Goto, 32; U. Suwa, 26.

Congress Asked $68,000,000 for Aviation

AN increase of approximately 50 per cent is provided for aviation in the Government budget estimates for the fiscal year commencing July 1, 1928. Appropriations totaling $68,064,118 for the major aviation activities of the federal establishment have been recommended to Congress by the Budget Bureau, an increase of $21,226,318 over the appropriations authorized for the same activities for the present fiscal year.

The Navy is awarded the biggest sum, and incidentally, the biggest increase for its aeronautical maintenance and development work in 1928-29. A total of $32,735,000 is recommended by the Budget Bureau for naval aviation as compared with $20,100,000 for the current fiscal year. Of this amount $16,500,000 is for new construction and the procurement of aircraft and equipment. This year $8,522,000 was appropriated for this purpose.

The sum of $1,800,000 towards the construction of the new 6,000,000 cubic-foot capacity dirigible, to cost $4,500,000, is recommended. Two million dollars is allotted by the Budget Bureau for continuing experiments and development of all types of aircraft, as against the appropriation of $1,728,600 available this year.

For the Army Air Corps an appropriation of $24,817,268 is recommended, an increase of $4,420,968 as compared with the figure of $20,396,300 authorized for this fiscal year. Included in this figure is an item of $2,200,000 to be expended for experimental and research work with airplanes and lighter-than-air craft. A sum of $11,257,445 is set aside for the production and purchase of new planes, under the five-year expansion program, as compared with $9,492,550 last year.

The Aeronautics Branch of the Department of Commerce would be accorded $3,911,850 for its aeronautical activities during the coming year under the recommendations of the Budget Bureau. For the current fiscal year $3,791,500 was appropriated for this new branch of Government aviation activity. Of the total for 1928-29, $3,209,850 would be for the establishment and maintenance of aids to air navigation, including the equipment of additional mail routes for both day and night flying, the acquisition of sites for landing fields, and the purchase of five planes for inspection work. The remainder of the recommended appropriation, $702,000, is intended for carrying out the provisions of the Air Commerce Act for promoting and regulating air commerce.

For the Postoffice Department an appropriation of $6,000,000 is recommended for the maintenance and operation of the contract air mail service. For the current fiscal year $2,000,000 was set aside for this service.

The National Advisory Committee for Aeronautics would be granted $600,000 for scientific work, or an increase of $50,000 over the funds provided for the present year.

With reference to this increase, President Coolidge, in submitting the budget estimates to Congress, stated that the increase of $50,000 over the total for 1928 "is necessary to enable the committee to carry more fully into effect its program of general research in the field of aviation; to operate efficiently and continuously the new propeller research equipment; and to provide for the purchase of three or four airplanes of modern commercial types for conducting free flight research."

With reference to Government aviation activities generally, President Coolidge said:

"We have proceeded sufficiently far in our air service program to show the wisdom of the legislative policy with regard to this important and developing line of Federal activity. Under this policy the needs of the Federal Government are being met with orderly stimulation of private industry. The appropriations of the past as well as the estimates now submitted are all in furtherance of this policy. Our procurement of aircraft and accessories is from private industry. This is as it should be. We have gone further

(*Continued on page 80*)

Current Comment

Accurate News

There is one thing that the air minded can do that will materially improve the publicity given aviation. Newspapers can be "called" regularly and consistently for the errors that are constantly appearing. One of the large transport companies is doing this by means of letters that show how newspaper headlines not only convey wrong impressions as to aviation but actually misstate facts. One of the first letters covered a headline that blared to the public "Aviatrix Crashes to Avoid Throng. Plane Damaged in 2,000 Foot Fall as Engine Fails." The errors were that the plane did not crash, as it landed and nosed over; it did not fall, as it glided down; the engine did not fail, it was stopped for landing. Apparently the only correct fact in the headline was the reference to avoiding the throng.

Other companies can follow the same plan in writing newspapers in order to gain the co-operation of the press in securing accuracy in the description of such accidents as occur to aircraft. We do not need the minimizing of accidents but we can ask for fair reporting.

Air Diplomacy Next

It would seem from already established results of Lindbergh's visit to our southern neighbors that some of the oil interests could afford to pension this young man for life. Seriously, however, aviation may yet revise diplomacy. Lindbergh's visit is for the most part a personality contact most excellently timed. But there is something about aviation and the problems that go with its development that should have a permanent and lasting effect on the desire for peace. No country can fail to be impressed by the visit of aircraft from a neighboring country, especially if the visitors make the journey in from a fifth to a seventh of the normal time required. It brings the two countries so close together in point of time that the obvious lessons can be drawn.

Clipped Wing Standards

The decision of the Department of Commerce not to interfere with old production ships that are airworthy is to be commended. Too many are bridging the gap between being earth-bound and being airminded for the department to wash them out. Many men are getting into the air with Standards who could not fly at all if they were compelled to purchase new production ships. These men are the best prospects for the makers of the new production aircraft. Age and lack of air worthiness will retire the old ships fast enough.

Likewise, the department's decision not to license clipped wing jobs and others in which the original design has been altered can be justified in more ways than one. Most important of all, perhaps, is the fact that, as designed, the ship was exceptionally able, and that structural changes make for weakening and consequent accidents. The accidents hinder the development of aviation. That's it in a nutshell.

The Washington Conference

Many conferences are merely talk-fests, but the conference of the aircraft industry with the Bureau of Aeronautics held in December served as something more. Unquestionably the Bureau received a first hand opinion of sentiment in the industry regarding some of the major problems of the day. In some cases there is little question that the Bureau received impressions that differed materially from the opinion previously held. But the general get-together of the east and west at this meeting and the exchange of everything from current gossip to hoary reminiscence cannot be discounted. It had a definite value, for it has become almost an axiom in this country that an industry is strong only as it is co-operative.

The New Commercial Models

Every old timer has something to say about the new types of aircraft that are being announced almost every week. In the opinion of some there will be too many planes in production in another six months. In the opinion of others there will never be enough to keep up with the demand. Of course both of these opinions are based on personal prejudice rather than on available data on which to form a judgment.

As a matter of fact no one knows the capacity of this country to absorb aircraft. No one knows today the buying capacity of our public for motor cars and yet we do have something on which to base such an opinion. Ignoring for the moment the new companies entering production, it is impossible to believe that the large and well-known companies now entering commercial work for the first time have done so without a careful survey of the possi-

Current Comment

bilities of sale. Larger production means lowered prices and that is followed inevitably by increased sales. It is the American plan.

Books on Aviation

The response of readers of POPULAR AVIATION to advertisements of books relating to aircraft and even the more technical aspects of aviation does more than show a tremendous interest in this newest form of transportation. Such an interest might, in some cases, be termed a passing fad, but when interested individuals reach the point where they eagerly seek everything in print on a subject it indicates more than a fancy. Thousands are not only reading aviation but are studying aviation, with the ambition to become identified with the industry in some way. Text book study has one decided advantage—it acquaints the reader with the limitations of a subject and in consequence the reader is stimulated to overcome the obstacles. To say "This can't be done" is far more of a challenge than to state "You can do anything."

The Airways Schedule

If you will turn to pages 42, 43 and 44, you will see that the airways schedule which POPULAR AVIATION initiated several months ago has grown. When the first consolidated schedule ever printed was published in POPULAR AVIATION it occupied only 60 per cent of the present space. New service lines are being added at a rate that leads us to believe that it will not be long before it will be necessary for us to publish this timetable as a supplement to our issue. Meanwhile the air minded public can feel encouraged that services are available in so many different parts of the country and that each month sees the establishment of others that will soon cover the country with a network of high speed transport lines, safely operated and well patronized.

The Bearer of Peace

An English contemporary, Lord Thompson, in his book on the problems of aviation in its many applications to life, and also the destruction of life, arrives at the not illogical conclusion that aircraft may yet bring about world peace. He is not so certain that this peace may come without a war. In fact, he seems to incline to the belief that the world runs the risk of receiving a horrifying example of the power of aircraft in bringing war to the stay-at-home public. Certainly well planned and vigorously carried out offensive against a neighboring nation could shock the people of every nation, except, possibly, the ruthless victor.

It is this same power of the airplane to practically anihilate space that Lord Thompson believes to be aircraft's great advantage in pacifying the world, but in a different way. Better and quicker communication means closer business relations; and one does not make war on a customer.

The Sport of Gliding

With this issue POPULAR AVIATION makes a start in a department that will be devoted to motorless gliding or sail flying, as some prefer to call it. This is either a sport or a science. Probably the first, as enthusiasts take it up as a hobby and later find that it is to their advantage to make a science of it. It satisfies the participant in three different ways. There is the display of ingenuity in design, the satisfaction of construction by one's self and the thrill of flying. It is a sport that can be pursued at little expense. It is the logical step after model building for the young man who wishes to become an adept in the air.

The New Ocean Charts

The decision of the United States Hydrographic office to issue monthly charts of air conditions over the Atlantic is a step that can be considered fully in advance of the times. Instead of lagging behind and starting to collect this information after the establishment of ocean air lines the government, in co-operation with several foreign countries, is now building the necessary foundation of experience and data observations so that the first oceanic air transport companies will have a valuable fund of information on which to base routes.

The Other Openings

Many of our youth have an overweening ambition to fly the mails. This is laudable, though requiring more training than most of them realize. How many of them realize that opportunity is not confined in this business to the flying of mail or commercial ships alone? For every place in the air there are from four to ten places in the ground organization, that most necessary adjunct to the proper commercial operation of air transport. These places will be filled by qualified men with experience along traffic and other commercial lines.

Gliding Planes Offer Opportunities

The aviator who is interested in the sport of flying gliders or sail planes is offered a number of excellent opportunities for developing and displaying skill. His work is rewarded in contests and the the service he renders in research.

WONDERFUL advances have been made in the design, construction and flying of motored air planes. The pioneers in the field of aviation started with gliders and with planes having motors of small power. The development has been along the lines of gaining speed with more powerful motors, and the results have been remarkable in the way passengers and freight are being handled by way of air. Heroes of aviation have been made by the scores until it seems as though there were no more room for them. Yet, aviation will always have its opportunities for those young red-blooded men who want to count for something worthwhile in the progress and popularizing of aviation.

There is one field of aviation that has been sadly neglected. It holds almost unlimited opportunities in skill and achievement. It has been recognized as such for several years in many European countries, especially in England, France and in Germany. It is time that the American enthusiast for popular aviation arises to develop and display his skill in this particular field. This is the field of gliding or flying with a motorless airplane. We should know more about it and for this reason it is worthwhile to know what the progress in this particular field has been in Germany. Dr. Eng. A. Proell of Hanover is an authority on this sport and he has written an excellent article on the scientific importance of sail flying with particular reference to the Fourth German Seashore Sail Flying Contest held in Rossitten on the Baltic Sea several months ago, which was published in the "VDI-Nachrichten."

The glider contest which was held this year in the dunes near Rossitten in Eastern Prussia, again gripped the public interest with its outstanding performances and unexpected records. As always, the question concerning the purpose and aim of gliding appeared again. It is not surprising that people who watch from a distance connect the efforts in gliding with the aims of motored plane transport, and believe that air transport can with some effort be maintained without the use of motors. This assumption is, of course, not correct.

Hans Richter about to take off in his motorless glider. Surfaces are well adapted for control.

There were 33 gliders registered for this last contest at Rossitten. Several of these carried two persons each. Nearly all registered machines participated in flying. On favorable days there was very active flying in the extensive territory on the shores of the Baltic Sea, which was suggestive of the best flying days ever had at the Rhoen field. The Wasserkuppe, a mountain used for take-off, located in the Rhoen, and the long extended dunes of the Kurische Nehrung have become the classic places in which German gliders have come to great achievements.

The first flights were simply gliding flights made by the sport-loving students from Darmstadt. They continued the early attempts of Lilienthal with new means and with increasing success. In 1912 Gutermuth covered a gliding distance of 2,625 ft. Then followed the first actual sailing flights in ascending wind currents. The planes were similar to the design of the Vampyr. These flyers astonished the world with the first motorless endurance records made by students from the high schools of Hanover and Madelung.

Having come thus far in the development of gliding, the glider used at the present was given its principal form. All gliders developed since then have been built more or less according to the same general design, even though they may have been improved in some important, though really not fundamental details. From this time on, progress is noted not so much by the development of new gliders, but rather by the continually increasing skill of the flyer. It is worth considering that today the flyer is the most important part of the entire combination of the glider and its pilot. In this science, the determining factor is the personal element—the art and the skill of the flyer.

Independent comparisons of individual gliders are possible only when they are flown by the same flyers or at least by flyers having the same degree of skill and under similar conditions. This fact must be considered especially when judging the performances in a gliding

contest. It is therefore true if one speaks of a contest of flyers rather than of a contest among gliding planes.

After success had once been attained in gliding in hanging or upward-moving winds, glider enthusiasts attempted to cover long distances along far-stretching slopes. For this purpose greater altitudes had to be gained above the level where the takeoff was made. Finally, by combining these efforts, they began to glide across open territory without taking advantage of sloping winds. For such purposes, it was necessary to utilize some other sources of upward-moving winds, including not only the thermic or warm air currents along the shore, but also the friction air currents and dynamic squalls. Thus, the purposes of gliding, which were first naturally more those of sport, brought up for consideration the aerologic questions of sail flying. The glider then became an important means of investigation in this field.

The gliders which appeared at Rossitten and their performances showed the chronological development described above: gliding and schooling plane, sail plane for sailing in simple sloping or upward-moving winds, high performance gliders for aerologic investigations, auxiliary motor gliders and finally motor planes with trailers or attached gliders.

The active schooling or instruction experiments with the lattice tail gliders of the Pegasus type gave a pleasing picture of the increasing interest shown in the sport of gliding. The high planes of the Vampyr type, largely those with oval cross section of the fuselage, control the field of sailing and high performance planes. Many, and especially the best planes, such as the Konsul, the Phoenix, the Roemryike Berg, have been in use several years, yet they were still active in many contests, even though they had been repaired repeatedly.

Flyers such as Schulz, Nehring and Kegel were present with added accomplishments, for their excellent flights emphasized the fact that the personal aptitude of the pilot is as important as technical and scientific advances.

Among the more recent planes there were many interesting and well-thought-out individual designs. This was particularly true in the selection and construction of the shape of the wings and controls and in the suitable light coverings, control lines, etc. Special mention should be given the designs of the aviation society "Fulda," and of the academic flying unit "Marcho Silesia" of Breslau, which has developed a seat glider for schooling. In general, the dimensions and shapes of these machines differed but little. Special features such as appeared in the past, as for instance, surface control, adjustable profiles, etc., have disappeared in favor of the rigid surface with heavy profile as in the Vampyr type.

J. Jeyes of the Royal Aero Great Britain, in his glider, practicing landings.

The performances of the flyers and the planes consisted at this time of very long distance flights. These flights and also the 14-hour duration flight of Schulz, are first of all of the greatest importance to the sport of flying. In each performance of a sport there is hidden some material than can be used in the science. In sail flying, especially, one grasps the spirit of the sport which serves to recruit the necessary increase in flyers.

The high value of the flying records must be placed above this in scientific and technical respects. There are, to a certain extent, aerologic, aero-dynamic, flying-technical and constructive problems that await solution by the glider. Attempts have been made to solve aerologic problems at weather report stations by observations made in pilot balloons, and by occasional measurements made in motored planes. Data on the direction and strength of the air currents were thus secured. One could, in fact, make soundings in the ocean of air at various places. But in this work the thermic and other influences and hindrances to the important wind elements were not sufficiently determined to be of use in practical flying, especially for the light-motored planes. One obtained merely values in points and lines which of course could often be worked out by interpolation into a usable comprehensive picture.

The research sail plane, however, was not only the test, but at the same time the example in this field of research. With well-calculated flights carried on and with the instinctive understanding of the pilot, the same results could be obtained definitely. This helped greatly to further the knowledge of the conditions of the air.

The most outstanding performances of this type have been carried out by Nehring and Schulz, in their flights along the low dunes of the west coast of Germany. They recently flew from Rossitten to Neukuhren, and Cranz, distances of 28 and 22 miles. In these flights the type and extent of the field of upward moving winds along the coast, which consist of friction, inclined and thermic currents, can be recognized directly, since the flights could be recorded at different points by special moving picture apparatus. To this could be added later the 39 mile flight of Schulz to Memel. Due to the very strong west wind of 59 ft. to 72 ft. per second there were, even at the lowest places, sufficient upward wind currents to make this flight the equal

of other great performances of Schulz. Perhaps such a long flight could have been made last year had permission been had to cross the territory in Lithuania. At that time the flights had to be limited to 6 miles.

An essential difference between the great distance record and the 34 mile flight of Kegel last year must be mentioned. Here the upward moving currents along the west dunes, which were only a few feet wide, were utilized systematically and conscientiously for many miles at the same altitude due to sensitive steering of the glider. Kegel, on the other hand, permitted himself to be raised more than 3,280 ft. in the open territory by drifting with the upward moving currents which moved ahead of a thunder cloud, in order to gain, afterwards, great distance in a wonderful gliding flight partly in fog and with rear winds. The squalls of the air currents and their kind and their strength are slowly becoming comprehensively clear to the glider. The records obtained at the west dunes for the purpose of investigating the combinations of air currents should be developed further and also repeated at other places.

Another group of investigations serves for the increase in the knowledge of aero-dynamics and flying technique. The plane as such, the wings and shape of profile, the arrangement of controls, shape of fuselage, etc., are to be tested systematically in respect to their suitability for sailing, that is, for motorless flying, without losing altitude in the wind. For this purpose the pure gliding flights are best suited, possibly when there is not any wind and with an accurately measured starting energy, as pulling up with a cable. Of course, a main contest, in which the winds are inviting aids for flying, is not well suited for these investigations, but data can be obtained which can be utilized in making investigations after the contest is over. Tests of this kind have been made repeatedly at Rossitten in former contests and with good results.

The constructive problems have been investigated but little. It would be of advantage to investigate the various types of wing design and fuselage connections, etc., especially the weight in relation to the requirements and the changes in shape during flights. Especially the vibrations of wings and control works which have brought dangers in motor flying, could be studied here with little danger, and means taken for their prevention.

The results of such tests with sail planes have an increasing importance in perfecting light and auxiliary motor planes. With the latter, it is a question as to how little motor output is necessary for practical, useful flight. A solution is considerably furthered by the experiments in gliding or sail flying.

In Rossitten there was a good representative of such an auxiliary plane of smallest design. The well known flyer, Max Kegel, placed a 9 hp. DKW two-cylinder bicycle motor on the carrying surface of his plane for driving the metal propeller directly. He found this arrangement to be a favorable solution for the easy transition to the auxiliary motor plane. In fact, Kegel was able to start with a simple landing gear in this plane, from an horizontal surface, and fly or climb with his motored plane to a desirable altitude and then attain with the motor cut out a very good performance in gliding. In this flying he used an airplane meteorograph and obtained with it valuable aerological results even above the Rossitten hole, which had been inaccessible to sail planes in the past.

Ferdinand Schulz and his famous glider with which he has broken so many records.

In this way the sail plane becomes independent of mountainous territory. This advantage is obtained by the most recent development, the trailer plane of Essenlaub. It was astonishing to note how this original flyer was able, with the use of a home-built motor plane using a 35 hp. Anzani motor, to pull a small attached sail plane from the starting place in Rossitten to Predienberg, a distance of about 3 miles. His first attempts and those of the Raab-Katzensteinwerke are now fairly well known. Thus an idea has been realized which seemed out of place when suggested more than 2 years ago by A. Proell as an aid in starting gliders. This permits sail flying in regions where there is a lack of suitable territory such as hills, and valleys with upward-flowing wind currents, etc. The trailing sail plane or glider may be unhooked at any desirable place in the air, so that it may continue flying independently. Only in this way will it be possible to solve aerologic problems which are based on the investigations of the open atmosphere—vertical currents of thermic nature beneath or ahead of the clouds. Furthermore, the possibilities of the sport of sail flying are much more extensive. Finally, methods may be developed in connection with it for the investigation and direct measuring of the resistances to planes.

If the results of the gliding or sail flying contest at Rossitten are now summarized, it becomes apparent that all points mentioned here have been covered with corresponding performances. They are summarized as follows:

1. Endurance records in sloping or upward moving winds: Ferdinand Schulz flew 14 hours by utilizing at the same time the squalls for dynamic sailing. This long flying period, which is a giant personal and physical performance, offered also the special advantage that Schulz utilized the various air currents which were encountered, some of them being very favorable.

2. Schulz was also able to attain an altitude record of 1,624 ft. above the dunes by favorably adjusting himself to the various influences of the air.

3. The distance records obtained at this time were, almost without exception, at the low west dunes of the Baltic Sea, which were favored by continuing west winds of 39 to 72 ft. velocity per second. Nehring was the first in successful pendulum flights on May 9, after which followed the great record flights on May 11, when 28 miles were covered to Neukuhren and when Schulz covered 22 miles to Cranz in

(*Continued on page 79*)

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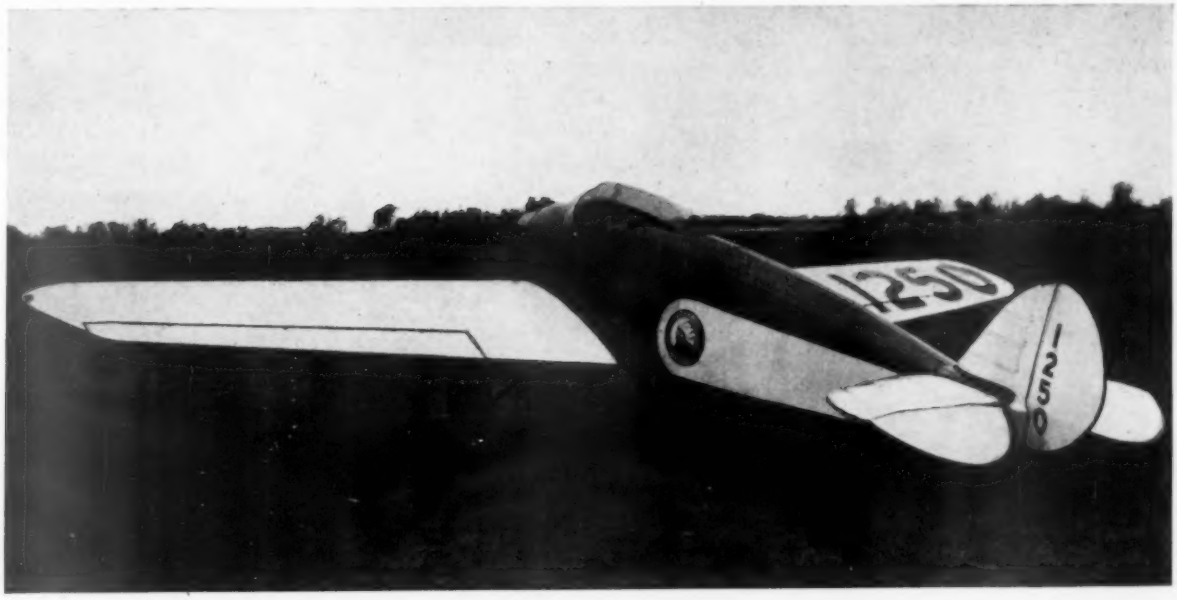


Mohawk "Pinto" Light Monoplane

A two-passenger monoplane designed and manufactured by Mohawk-Aircraft Corporation, Minneapolis, Minn.

Specifications

General

Type	Low Wing
Use	Sport
Length, over all	22 ft.
Height, over all	6 ft. 3 in.
Span, over all	30 ft. 6 in.
Chord Average	4.4 ft.
Crew	One
Passengers	One
Control	Stick

Power

Type	Air-Cat
Rated Horsepower	60
Cooling	Air
R. P. M.	1,750

Wing Data

Curve	Modified U. S. A. 35
Sweepback	None
Dihedral	3½°
Spread	30 ft. 6 in.

Areas

Area of wing, including ailerons	124 sq. ft.
Ailerons	Balanced

Weight

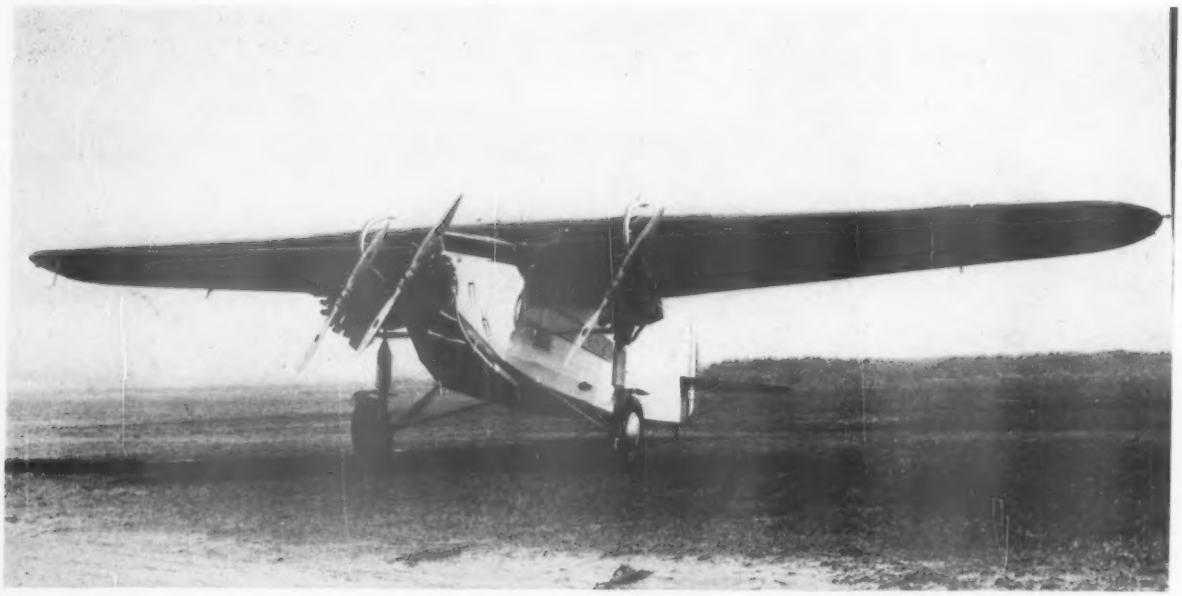
Weight, empty	700 lbs.
Useful load	500 lbs.
Normal weight, fully loaded	1,200 lbs.

Performance

Power per horsepower, loaded	20 lbs.
Pounds per sq. ft., loaded	10 lbs.
Cruising speed, approximately	85 m.p.h.
Climb in first minute, loaded	800 ft.
Service ceiling	12,000 ft.
Cruising range	4 hrs.
Landing speed at sea level	55 m.p.h.

This page, and the other side, is the fourth of a complete series covering aircraft manufactured in the United States. Every month POPULAR AVIATION will publish the specifications of different aircraft in a standard form, and the entire series will afford you a master reference guide of the types and make of aircraft in the United States. The selection printed every month is chosen at random by POPULAR AVIATION and no attempt is made to publish the specifications in any order, alphabetical or otherwise.

Index of American Aircraft



The Fokker "Trimotor F VII"

A twelve-passenger cabin monoplane designed and manufactured by Atlantic Aircraft Corporation at Hasbrouck Heights, New Jersey

Specifications

General

Type	Cabin
Use	Commercial
Length, over all	49 ft. 2 in.
Height, over all	12 ft. 9 in.
Span	63 ft. 4 in.
Chord	Variable
Crew	2
Passengers	10
Control	Dual-Deperdussin

Power

Type	Three "Whirlwind"
Make	Wright
Rated Horsepower	220 ea.
Cooling	Air
R. P. M.	1,850

Wing Data

Curve	Fokker
Sweepback	None
Dihedral	None
Spread	63 ft. 4 in.
Construction	Built-up Box Section
Covering	Plywood

Areas

Rudder	Not Balanced
Ailerons	Not Balanced

Weight

Weight, empty	1,970 lbs.
Useful load	4,000 lbs.
Pay load	2,340 lbs.

Performance

High speed ground level	122 m.p.h.
Cruising speed, approximately	100 m.p.h.
Climb in first minute, loaded	530 ft.
Service ceiling	16,950 ft.
Fuel capacity	5 hrs.
Cruising range	500 miles
Landing speed at sea level	45 m.p.h.

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A Few Problems Solved

By Our Own Designer, A. Roe Foyle

I GUESS I have arrived all right. Just look at these letters:

Dear Editor: This new designer of yours seems to be a pretty smart sort of fellow. Our only fear is that he will educate himself to such a point that he will be smart enough to solve all the problems that are facing us and then we will be out of work.

Dear Editor: Who on earth is this A. Roe Foyle that is designing ships? I understand that he is at liberty at present, but I can't conceive how that condition will prevail. Certainly it is only a matter of time before he is snapped up.

Dear Editor: The Bat is certainly a clever conception and embodies ideas that we manufacturers have been wanting to put into aircraft for a long time. Once down on paper and explained in such a simple fashion it seems absurd that none of us have thought of these ideas. I suppose the trouble with us that we are too apt to believe what our own technical men tell us and so limit our imaginations. With aircraft the sky should be the limit.

Well, the editor sent me the above letters to show me that my first article was noticed by some of the big fellows in the aviation game. He must of taken his scissors and cut the names off the letters, because he explained that the letters were confidential. He also said he had others he didn't care to show me at the present time.

Now, I call that pretty good, especially to get recognition so early, and if it isn't a good start I'd like to know what it is. My consulting engineer friend told me so in these very words: "Boy, you want to get a good start, a mighty good start, before you meet these big fellows."

So I decided to make a name for myself first as an experienced writer on technical subjects, and by that time I will be able to just about pick what I want. My friend warned me that I would get mighty little thanks for correcting a lot of things wrong with the industry.

We wish to serve notice on the industry that we will not brook any interference with Mr. Foyle's connection with us. Furthermore, we decline to give his address to any interested or infuriated parties as we do not care to lose him.—The Editors.

"You want to remember that there are a lot of men whose bread and butter depends on the work they are doing every day, so leave them something to draw wages for."

But I just said, "If I work these things out in a short time it is just their fault for being slow."

I got a list of things that seem to need working on and I'll give them to you. If you can think of any more let me know and I will start working on them. You want to remember that I have a real system for getting results. You see, I am technically trained all right and I have my consulting engineer who really knows his stuff. Some one wrote me to ask who he was and how he was connected with aircraft. So I might as well say right now that he tells me that he is consulting and designing engineer for a concern that is a large manufacturer of parts used in aircraft and aviation engines. He is with the Atlas Cotter Pin Company, probably the largest company of its kind in the world. That certainly answers that question.

First of all, there is the question of skidding. I notice in all the flight manuals and instructions that skidding is dangerous and students are given lessons in turning without skidding. Well, it only took a minute's thought to get rid of that. Of course, you can't put skid chains on an airplane the way you can an automobile, but you can figure out an anti-skid device, and I have done it.

I have figured on a series of little fins on the wings. Well, when the air is particularly skiddy you just pull a lever in the cockpit and that raises the skid fins. When you make a turn the air pushing against the skid fins prevents the plane from sliding around. It will also prevent slipping.

I decided after a conference with my engineer that I would devote my time at the present to making flying more comfortable. It all came from a casual remark he made after I told him what I was going to do.

"Well," George said to me (George is his name), "Why monkey with all those things when you might be doing something important and big, like taking the bumps out of the air?"

Following my usual custom I investigated very carefully before going ahead and I have found out that it is a problem no one has worked on at all, that is, not from a standpoint of preventing them. That is one of the troubles with this infant industry, no one seems to pay any attention to a lot of details that are really important.

And this is important because all the flyers tell me that people are made uncomfortable by the bumps. At the same time they asked me to work on a self cleaning cabin, but that hasn't anything to do with problem so I'll leave that for the time being.

Honestly it is surprising that no one thought of a perfectly simple solution for this matter of the bumps. I told George that my scheme would take care of it, and then I explained it to him and asked him if it wasn't ridiculously simple.

"Ridiculous is the word," said George.

Here it is in a nutshell: Take the monoplane for example. Right where the struts are fastened to the wing you insert a snubber or large sized shock absorber. At the other end you put one and where the fuselage is attached to the wing you put a complete set of them. This allows the whole fuselage to give a little every time a bump is hit and instead of a bump all you get is a little sway.

George tells me I won't have to bother about the tail surfaces, but they

could be mounted the same way too, at an additional expense of maybe a hundred dollars. George tells me that unless the sway is enough to set up a pendulum action that there is no reason why the device would interfere with the proper loading of the machine. Those were his very words:

"Since you ask me I'll be perfectly frank to tell you that these springs will not interfere in any way with the proper loading of this machine. You ought to use Scotch springs, though."

"What sort of springs are they?" I inquired.

"Well, they only give a very little and that after a great effort," said George; so that is the kind we will use. George says they can be had at any ship-chandlers as their chief use is for stepping masts in schooners so that a gale won't blow them out.

Just to show you how a trained man can seize on any little idle thought and expand it into a real profitable idea: George's remark about the pendulum reminds me that I have figured out a pendulum type cabin for enclosed jobs that will entirely eliminte one of the things people hate about flying. When I went up I noticed that every time the pilot banked rather sharply I would grab hold of something to hang on. So did every one in the cabin. Now that was silly of us because it didn't do any good. But this pendulum idea will keep people from having that funny sort of sinking feeling when you find yourself leaning sideways and looking down at eight or nine miles of air. (Of course, not actually that high but close to it.)

The idea is to hang the cabin on a sort of hinge so that it will aways stay in a vertical position. And that gives me an idea for the name—Foyle's Vertical Vertigo-less Cabin. Pretty good.

Now here is my proposition. I am not after any money; in fact, George tells me I ought to be pretty careful about accepting any money.

"I wouldn't have the heart to take money under the circumstances," he said, and that's just the way I feel about it.

Now I am perfectly willing for anyone to use these ideas. I am giving them away. George, you know, my consulting engineer, is rather contradictory sometimes, because first he suggested that I ought to give them away, and then said I'd probably get what they were worth out of it. Then he said, "As far as you are concerned the ideas are a give-away." So we are going to leave it at that. Any one can use these ideas and all that I ask is that I get credit in the advertising, by speaking of the ideas as "Foyle Design Fuselage Snubbers," etc. and etc. My consulting engineer warns me to watch for misspelling.

After I have had that sort of recognition it won't be hard for me to walk into almost any aircraft plant and introduce myself as Foyle, the designer of the Foyle this and the Foyle that, and I certainly ought to get an audience at least.

"Audience," said George, "I'll tell a man you'll get an audience. You ought to get as good a hearing as Will Rogers."

"Will Rogers," I said, "what has he got to do with the aircraft business?"

"Nothing," said my neighbor.

"Well, why bring him in?" I asked. "Am I like him?"

"Why, no," said George, "you see, Will gets money for it, but you work for nothing."

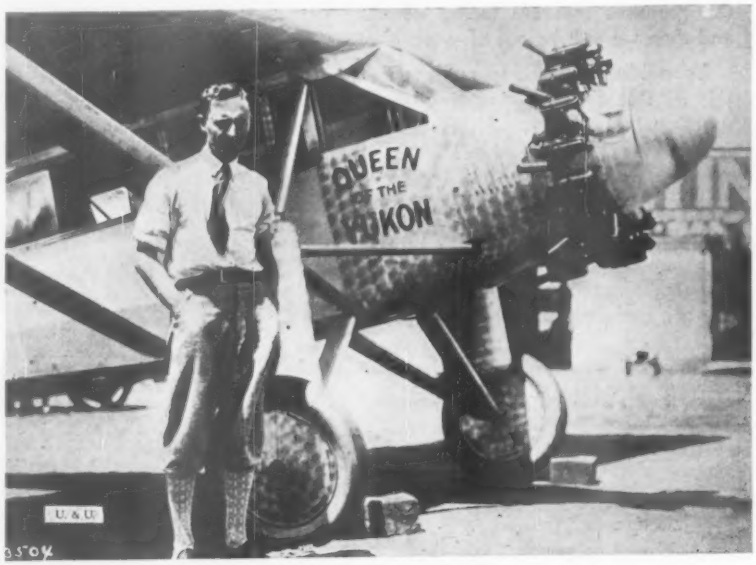
"Strikes me as silly," I replied with dignity.

"Not silly," said my engineer, "Just wasted."

"Queen of the Yukon"

Five hundred and fifty miles daily with the thermometer hovering uncomfortably close to 40° below zero are the figures written in the log book of the "Queen of the Yukon," a sistership of Col. Lindbergh's "Spirit of St. Louis," which carries the Air Mail between Whitehorse, Alaska, Mayo and Dawson. "This four hour and thirty minute trip by airplane would require fourteen days by stage and eighteen days by dog sled to complete," writes Chief pilot Andrew Cruickshank of the Yukon Airways and Exploration Co., Ltd., handling the Air Mail contract.

This company, in addition to being the farthest North airline in operation has the authority to print and issue its own Air Mail stamps, conduct its own postoffice terminals, and act as agents for the Royal Northwest Mounted Police.



Andrew Cruickshank with his "Queen of the Yukon," a Wright powered Ryan monoplane.

The plane is a Ryan Brougham with Whirlwind motor and was delivered to the Yukon Airways early in July. Before it was taken into the Yukon, Pilot Cruickshank and Bill Monday of the B. F. Mahoney Aircraft Corporation, builders of the plane, used it extensively near Reno, Nevada, flying from a salt marsh 7,000 feet above sea level in the Rocky Mountains. The plane was then fitted with special heaters to keep the insulated cabin comfortable in the extreme cold of the far north and flown to Whitehorse, Alaska.

During the past months operation there has been only one delay, that due to the oil of the motor freezing during a short stop on the trip north.

Winter Model Work

By Bertram Pond

DO you know that there is worlds of instructive enjoyment to be obtained from building indoor models, gliders and scale models and flying them in the parlor, schoolroom, banquet hall and other enclosures? The winds and cold prevent outdoor duration flying in winter, but provide zest for making indoor models, the harder the cold winds blow the harder you work to make that indoor machine. True, the wise model fan constructs several designs of outdoor ships and spare parts for an early start at outdoor flying in the spring.

But to get some of the basic ideas driven home, we must "crawl before we walk" or start back a way and see "how" and "why." Next month there will be a more elaborate model, but no more interesting than the glider described in the following paragraphs.

We have selected a "pusher" glider, for several reasons, over a "tractor." The "tractor" is not as stable in flight and it requires an extra balance weight out in front to balance the tail. The "pusher" is simple to build. (We use the words "pusher" and "tractor" for clearness, though they do carry the idea of the use of power.) The florist's box for the Scout Model will probably contain the glider. We can get along with the same tools, only sharpen the marking gauge to a keen dagger point.

Material List

One body stick.
Two wing beams.
One strip bamboo.
One sheet Japanese paper.
One can ambroid, two ounces.
One bottle banana oil, two ounces.

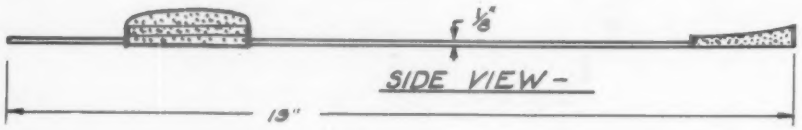
Before starting the construction of this glider, refer to pages 44 to 47 in the November issue of POPULAR AVIATION and study the construction of the indoor model shown there.

We will discuss the construction and operation of the glider in the following steps: (1) Wing, (2) body, (3) assembly and gliding.

1. As in the "Scout Model," a good plan is to assemble the parts made as per drawing on a full size drawing and pinning the parts down while glue applied to the joints is drying. Make the parts as light and neat as possible. In the "pusher" glider the wing is assembled practically flat on the body of the machine; so, two equal height wing clips are required. Make them to the full size just as shown on the drawing. See that these clips are adjusted to hold the wing without slipping and yet without crushing the body stick. When the

INDOOR "PUSHER" GLIDER.

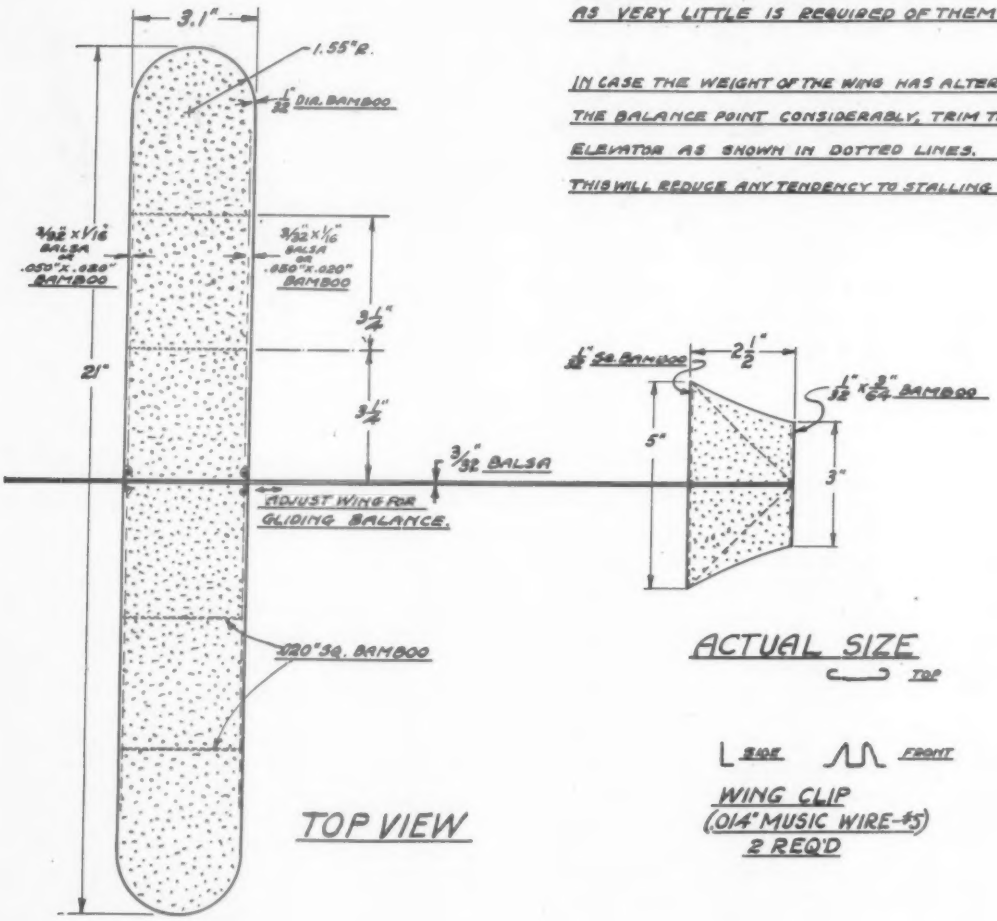
SCALE 1/4 SIZE—.



FRONT VIEW

SPECIAL NOTE: FOR A SLOW "HOVERING" GLIDER, MAKE ALL PARTS VERY LIGHT, AS VERY LITTLE IS REQUIRED OF THEM.

IN CASE THE WEIGHT OF THE WING HAS ALTERED THE BALANCE POINT CONSIDERABLY, TRIM THE ELEVATOR AS SHOWN IN DOTTED LINES. THIS WILL REDUCE ANY TENDENCY TO STALLING.



TOP VIEW

ACTUAL SIZE

TOP

SIDE FRONT

WING CLIP
(.014" MUSIC WIRE—#5)
2 REQ'D

wing is all trued up and glued together well, it is ready for the paper. It is easier to paper when you have a piece of smooth paper just larger than the wing. (Leave about one inch margin.) The assembled wing should be just light enough to bend slightly from its own weight.

2. The body is just a frail, slim stick of light balsa to hold the wing in its proper position, and in our case to build the elevator on. Give the stick an extra coat of banana oil where the wing is to clip on.

3. The whole job of building the glider is short and simple and if it is freighterweight enough we need only slip the wing in place to make a trial glide. Hold the machine horizontally and release it at about its gliding speed and angle. To keep the outer leading edge of the wing from fluttering down, make about 1/16 inch extra dihedral in them as shown on the drawing. After the wing setting has been found which gives the longest and smoothest glide, mark the side of the body for future reference. You are now ready to have the glider timed for a flight from a certain height to the ground. Six feet is usually sufficient for indoor gliders like this one.

Slide the wing forward and slide the wing backward from the even keel setting and study the actions of the glider. This will prove a great help in adjusting the power flying models.

A Little Secret

In the past the Illinois Model Airplane Club has won so many national events and set so many of the world's model records—for a time holding all important ones—that some skeptics would not believe it could be done. The Model Club had guarded a few of its simple tricks and in furnishing data on models left out the "secret" parts. Others found that their models would not fly, when constructed from this "pruned" or incomplete data.

The result has been an entire reversal of policy, and the results are well worth while. The simple little "secrets" which are now made available to all and appear here and there on models described in POPULAR AVIATION. The "cans" are only one of the many simple "secrets."

New ones appear in POPULAR AVIATION every issue. Practically all of the winning models at Memphis used one or more of the I. M. A. C. original ideas. Go to it! Let's see how many records you can break this year. You are getting all of the ideas that had been holding up your progress. Combined with a few ideas of your own, the models at the next National Tournament should give the timers plenty of exercise.

Model Department

Special note: Secretaries of Model Airplane Clubs, be sure to send name and address and brief history of your organizations for the Popular Aviation Model Club Directory.

So far, POPULAR AVIATION has presented a fine assortment of model news. We have given our fullest cooperation, donated medals and trophies for the National Model Tournament at Memphis last October 8.

We have arranged a series of constructional articles with drawings and pictures of some of the best prize winning and record holding models gathered from all over the country. More and better articles are in store for you. Watch for more scale models. Perhaps you have missed some article of interest, so we give the following:

Index to Popular Aviation's model section to date.

August, 1927

Page 39—Article about "Boy's Model Club." (Picture.)

Page 40—Article on helicopter, "Back Yard Airdromes." (Picture.)

September, 1927

Page 34—Details of National Playground Miniature Aircraft Tournament. (Picture.)

Page 35—List of books on Models.

Page 36—Article on "Model Airplane Construction."

Page 37—"How to Make a Model Glider." (Drawing.)

Page 38—"Model Airplane Fittings." (Drawing.) Continuance on Page 50.

Page 50—"Model Airplane Propellers." (Sketches.)

Page 53—A fine model for indoor flying is described here as "Indoor Tractor Model Airplane." (Drawing.)

Page 54—"Scale and Hydro Model Airplanes." (Sketches.)

October, 1927

Page 34—"Model Airplane Construction." (Picture.) (Sketch of winder.)

Page 35—"A Model Box." (Drawing.)

Page 36—"Twin Pusher Model." (Drawing.)

Page 37—Pictures of Memphis Trophies.

Page 52—"Tractor Model Airplane." (Drawing.)

Page 54—"Compressed Air Model." (Drawing.)

Page 55—Picture.

November, 1927

Page 41—This is an article which gives a considerable number of the "keys to success" in the building of models that really fly far and long. Be sure you have this article for your handy reference in building models. "Model Airplane Construction," by Bertram Pond. (Elaborate drawings of "A Few Details.")

Page 44—Drawing of "Pond Hand Launched Indoor Duration Tractor." Article about this former record holding plane on page 47. This plane made 170 seconds.

December, 1927

Page 21—This issue gives full details of the Memphis Model Tournament. (Pictures.)

Page 39—Picture. "Lange 262 4/5 Seconds Duration Model" is a good outdoor duration machine. (Drawing on page 40.) Won first at St. Louis, 1923.

Page 41—Drawing of Jaros "S. E. 5 Scout Scale Model" with building instructions.

Page 42—This machine won I. M. A. C. Scale Model Contest.

January, 1928

Page 46—A good model of the pusher variety, "The Lefker Prize Model" of the Memphis tournament. (Drawing and pictures.)

Page 48—A brief history is given of the club which originated many simple gadgets which have brought successful model flying within the reach of any handyman with simple tools. "The Illinois Model Aero Club."

Page 48—List of records. Save this for comparison with your model's performances to show you the possibilities.

Page 49—An easy model for anyone to build is the "Scout Model," with pictures and drawings. The wire

(Continued on page 74)

Phone For Passenger Rates

Air-Mail Schedules

AIRWAYS

Air Travel Information

Air-Express Schedules

† Express
•† Express and Passenger
Light face type —A. M.
Bold face type —P. M.

Express Mail — *New York to — NATIONAL AIR TRANSPORT — Chicago, 726 Miles*

Westbound	Close P. O.		Leave	Leave	Phone
	Day	Nite	Day	Nite	
New York, N. Y.	10:00	**6:30**	11:00	**8:00**	Lexington 8044
New Brunswick, N. J.	12:10	**9:30**	12:15	**9:35**	Nev. 4045
Cleveland, Ohio	3:35	1:35	3:35	1:30	Lakewood 9006
Chicago, Ill.			7:00	5:35	{ Harrison 8234 { Republic 4110

Eastbound	Close P. O.		Leave		Phone
	Day	Nite	Day	Nite	
Chicago, Ill.	6:30	**6:30**	8:00	**8:00**	{ Republic 4110 { Harrison 8234
Cleveland, Ohio	11:17	**11:30**	12:15	12:15	Lakewood 9006
New Brunswick, N. J.			4:45	4:45	Nev. 4045
New York, N. Y.			7:00	6:15	Lexington 8044

Passenger Express Mail — *Chicago to — BOEING AIR TRANSPORT — San Francisco, 1943 Miles*

Westbound	Close P. O.	Leave	Phone
Chicago	**6:30**	**7:50**	Wabash 8084
Iowa City, Iowa	**8:40**	**9:40**	425
Des Moines, Iowa			Maple 707W
Omaha, Nebr.	**10:30**	12:35	Atlantic 9301
North Platte, Nebr.		2:00	29
Cheyenne, Wyo.	3:30	4:45	656
Rock Springs, Wyo.	6:30	7:05	415J
Salt Lake City, Utah	9:00	10:50	Wasatch 5569-3321
Elko, Nev.	10:45	11:15	1553
Reno, Nev.	**1:00**	**1:45**	195
Sacramento, Calif.		**2:45**	
San Francisco, Calif.		Ar. **4:30**	Kearny 2041

Eastbound	Close P. O.	Leave	Phone
San Francisco, Calif.	6:05	7:00	Kearny 2041
Sacramento, Calif.	8:15	7:45	
Reno, Nev.	10:00	9:00	195
Elko, Nev.	**12:15**	11:00	1553
Salt Lake City, Utah	**3:00**	**3:05**	Wasatch 5569-3321
Rock Springs, Wyo.			415-J
Cheyenne, Wyo.	**7:30**	**7:30**	656
North Platte, Nebr.			29
Omaha, Nebr.	**10:30**	12:30	Atlantic 9301
Des Moines, Iowa		Deliver 1:30	Maple 707W
Iowa City, Iowa			425
Chicago, Ill.		Ar. 5:45	Hemlock 8180

Passenger Express Mail — *Chicago to — NATIONAL AIR TRANSPORT — Dallas, 989 Miles*

Southbound	Close P. O.	Leave	Phone
Chicago, Ill.	3:45	5:45	{ Republic 4110 { Harrison 8234
Moline, Ill.	6:50	7:20	Moline 738
St. Joseph, Mo.	10:10	10:20	St. Joe-6-0349
Kansas City, Mo.	10:50	11:08	Norclay 1093
Wichita, Kans.	**12:45**	**1:18**	Market 6185
Ponca City, Okla.	**1:40**	**2:05**	Ponca 9601-F2
Oklahoma City, Okla.	**2:00**	**3:05**	Walnut 4214
Fort Worth, Texas	**4:00**	**5:15**	Prospect 2169
Dallas, Texas		Ar. **5:35**	5-7113

Northbound	Close P. O.	Leave	Phone
Dallas, Texas	7:00	7:45	5-7113
Fort Worth, Texas	7:00	8:15	Prospect 2169
Oklahoma City, Okla.	9:00	10:10	Walnut 4214
Ponca City, Okla.	10:40	11:05	Ponca 9601-F2
Wichita, Kans.	11:15	11:57	Market 6185
Kansas City, Mo.	**12:15**	**2:05**	Norclay 1093
St. Joseph, Mo.	**2:17**	**2:40**	St. Jos. 6-0349
Moline, Ill.	**4.00**	**5:15**	Moline 738
Chicago, Ill.		Ar. **7:20**	{ Harrison 8234 { Republic 4110

Passenger Express Mail — *Chicago to — ROBERTSON AIRCRAFT CO. — St. Louis, 278 Miles*

Southbound	Close P. O.	Leave	Phone
Chicago, Ill.	5:20	5:50	Maywood 5010
Peoria, Ill.	6:55	7:25	Peoria 8195
Springfield, Ill.	7:45	8:15	Main 190
St. Louis, Mo.		Ar. 9:15	Avery 2725

Northbound	Close P. O.	Leave	Phone
St. Louis, Mo.	**3:30**	**4:15**	Avery 2725
Springfield, Ill.	**4:50**	**5:20**	Main 190
Peoria, Ill.	**5:40**	**6:10**	Peoria 8195
Chicago, Ill.		Ar. 7:30	

Passenger Express Mail — *Salt Lake City to— WESTERN AIR EXPRESS — Los Angeles, 600 Miles*

Westbound	Close P. O.	Leave	Phone
Salt Lake City, Utah	8:30	9:10	Wasatch 7023
Las Vegas, Nev.	**2:10**	**2:25**	Angeles 1786
Los Angeles, Calif.		Ar. **5:25**	Trinity 6754

Eastbound	Close P. O.	Leave	Phone
Los Angeles, Calif.	6:30	7:35	Trinity 6754
Las Vegas, Nev.	9:50	10:40	Angeles 1786
Salt Lake City, Utah		Ar. **3:20**	Wasatch 7023

AIRWAYS—Continued

Mail — *Salt Lake City to* — * *WALTER T. VARNEY* — *Pasco, 700 Miles*

Westbound	Close P. O.	Leave	Phone	Eastbound	Close P. O.	Leave	Phone
Salt Lake City, Utah	9:00	10:00	Wasatch 5755	Pasco, Wash.		6:00	31
Boise, Ida.	Ar. 12:30	2:50	2901	Boise, Ida.	9:00	9:20	2901
Pasco, Wash.		6:00	31	Salt Lake City, Utah		Ar. 2:45	Wasatch 5755

Passenger Express Mail — *Seattle to* — *PACIFIC AIR TRANSPORT* — *Los Angeles, 1,100 Miles*

Southbound	Close P. O.	Leave	Phone	Northbound	Close P. O.	Leave	Phone
Seattle, Wash.	11:20	11:45	Elliot 6688	Los Angeles, Calif.	11:20	12:01	Vermont 4279
Vancouver, Wash.	6:15			Bakersfield, Calif.	1:15	1:45	5655
Portland, Ore.		7:00		Fresno, Calif.	2:15	3:30	179-J-12
Medford, Ore.	9:00	9:30		San Francisco, Calif.	4:15	5:30	Douglas 3301
San Francisco, Calif.	12:25	1:15	Douglas 3301	Medford, Ore.	8:30	9:30	Walnut 4304
Fresno, Calif.	2:15	3:15		Portland, Ore.	11:15		241
Bakersfield, Calif.	3:50	4:45		Vancouver, Wash.		12:00	Vancouver 1307
Los Angeles, Calif.		Ar. 6:15	Vermont 4279	Seattle, Wash.		Ar. 2:00	

Mail — *Cheyenne to* — *COLORADO AIRWAYS* — *Pueblo, 199 Miles*

Southbound	Close P. O.	Leave	Phone	Northbound	Close P. O.	Leave	Phone
Cheyenne, Wyo.	4:10	5:30		Pueblo, Colo.	3:20	4:00	
Denver, Colo.	5:35	6:55		Colorado Springs, Colo.	3:30	4:50	
Colorado Springs, Colo.	6:30	7:50		Denver, Colo.	5:20	6:00	
Pueblo, Colo.		Ar. 8:30		Cheyenne, Wyo.		Ar. 7:30	

Passenger Express Mail — *Chicago to* — *NORTHWEST AIRWAYS* — *Minneapolis, 377 Miles*

Westbound	Close P. O.	Leave	Phone	Eastbound	Close P. O.	Leave	Phone
Chicago, Ill.		5:50		Minneapolis, Minn.	1:30	2:30	
Milwaukee, Wis.		6:50		St. Paul, Minn.	2:10	2:40	Cedar 5693
Madison, Wis.				La Crosse, Wis.	3:30	4:00	
La Crosse, Wis.		9:30		Madison, Wis.			
St. Paul, Minn.		11:30	Cedar 5693	Milwaukee, Wis.	5:15	6:00	
Minneapolis, Minn.		Ar. 11:40		Chicago, Ill.		Ar. 7:00	

Passenger Mail — *Boston to* — *COLONIAL AIR TRANSPORT* — *New York, 192 Miles*

Southbound	Close P. O.	Leave	Phone	Northbound	Close P. O.	Leave	Phone
Boston, Mass.	5:15	6:15	Hancock 4612	New York, N. Y.	3:00	6:00	Ashland 7750
Hartford, Conn.	6:15	7:35	2-9211	Hartford, Conn.		6:35	2-9211
New York, N. Y. (Hadley Field)		Ar. 9:15	Ashland 7750	Boston, Mass.		Ar. 8:05	Hancock 4612

Mail Express Passenger — *Cincinnati* — *THE EMBRY-RIDDLE CO.* — *Chicago*

Eastbound	Close P. O.	Leave	Phone	Westbound	Close P. O.	Leave	Phone
Chicago		6:00		Cincinnati		2:45	East 4254
Indianapolis		7:55		Indianapolis		3:00	
Cincinnati		Ar. 10:00	East 4254	Chicago		4:45	

Passenger Express — *THE AERO CORPORATION OF CALIFORNIA*

Eastbound	Leave	Westbound	Leave
Los Angeles	10:00	Tucson	8:00
Phoenix	3:20	Phoenix	9:25
Tucson	Ar. 5:00	Los Angeles	1:00

Light face type—A. M.
Bold face type—P. M.
*Walter T. Varney lines make train connections

Time used is local time, whether Eastern, Central, Mountain or Pacific.
with Portland-Spokane-Tacoma-Seattle.

Incomplete data will be filled in as rapidly as authentic information can be compiled.

AIRWAYS—Continued

Mail Freight — *Detroit to* — *FORD AIRLINES* — *Cleveland, 91 Miles*

Southbound	Close P. O.	Leave	Phone	Northbound	Close P. O.	Leave	Phone
Detroit, Mich.	9:10	10:40		Cleveland, Ohio	1:30	3:00	
Cleveland, Ohio		Ar. 12:10		Detroit, Mich.		4:30	

Mail Freight — *Detroit to* — *FORD AIRLINES* — *Chicago, 237 Miles*

Westbound	Close P. O.	Leave	Phone	Eastbound	Close P. O.	Leave	Phone
Detroit, Mich. (Central Time)	11:30	1:00		Chicago, Ill.	6:30	8:00	
Chicago, Ill.		3:00		Detroit, Mich.		Ar. 12:00	

Mail — *Cleveland to* — *CLIFFORD BALL AIRLINE* — *Pittsburgh, 123 Miles*

Southbound	Close P. O.	Leave	Phone	Northbound	Close P. O.	Leave	Phone
Cleveland, Ohio		12:15		Pittsburgh, Pa.		2:30	
Youngstown, Ohio		1:00		Youngstown, Ohio		3:15	
Pittsburgh, Pa.		Ar. 1:45		Cleveland, Ohio		Ar. 4:00	

Passenger — *Detroit to* — *STOUT AIR SERVICES* — *Cleveland, 91 Miles*

Southbound		Leave	Phone	Northbound		Leave	Phone
Detroit, Mich.		9:15	Clifford 0106	Cleveland, Ohio		9:15	Main 8833
Cleveland, Ohio		Ar. 10:55	Main 8833	Detroit, Mich.		Ar. 10:55	Clifford 0106
Detroit, Mich.		3:15	Clifford 0106	Cleveland, Ohio		3:15	Main 8833
Cleveland, Ohio		Ar. 4:55	Main 8833	Detroit, Mich.		Ar. 4:55	Clifford 0106

Light face type—A. M.
Bold face type—P. M.

Time used is local time, whether Eastern, Central, Mountain or Pacific.

Incomplete data will be filled in as rapidly as authentic information can be compiled.

Cuban Service Opens

The first of the two new Fokker Trimotors ordered for the latest air mail route was delivered last month to the Pan American Airways, Inc., of New York City. It is to be utilized both for air mail and passenger service between Key West, Florida and Havana, Cuba. This new air mail contract awarded by the Government fulfills a much needed want. It will eventually be connected to other air mail routes which will bring Havana nearer to New York City.

The Fokker plane was flown from Teterboro Airport to Key West, Florida, by Mr. Musick, a pilot of long standing in the Air Mail Service, and who is thoroughly conversant with this particular route, having flown it when the Aeromarine Company had the line during the winter months of 1920 through 1923.

Fokker Trimotor used for Key West-Havana mail and passenger service.

Mr. A. A. Priester, an expert on air transportation, who was operations manager of the Philadelphia Rapid Transit Air Service, Inc., during their operation of the Philadelphia-Washington-Norfolk air mail run, has been placed in complete charge of the operation of the new line.

The officers of the Pan American Airways, Inc., have left no stone unturned to make this air route a success from the beginning by obtaining the services and profiting by the experience of these men.

The second Fokker Trimotor which was purchased for the same service was delivered three weeks later.

After test flights which were made at Teterboro Airport by Lieut. Balchen, co-pilot of Commander Byrd's famous Fokker Trimotor "America"—in the presence of the officers of the Pan American Airways, who were extremely pleased with its performance, Mr. Arthur Musick, a pilot for this new air mail route, flew the ship to Key West. Mr. A. A. Priester and Mr. J. T. Tripp of the Pan American Airways together with John McPhail, expert Fokker mechanic, accompanied

Mr. Musick. The flight was made in easy stages, four intermediate stops being made.

This new air mail route will be one of the links which will eventually connect all important cities on the eastern sea coast. It is now in operation between Key West, Florida, and Havana, Cuba. The schedule maintained will be as follows:

Leave Key West.....7:30 A. M.
Arrive Havana.....8:40 A. M.
Leave Havana.....5:00 P. M.
Arrive Key West.....6:10 P. M.

As readily seen, the allotted flying time is one hour and ten minutes against the usual time of six and a half hours by steamship. This brings Cuba within easy access to the United States and should have far reaching results, both in governmental and trade circles.

Air Mail Needs Support

By Rep. Clyde Kelly, of Pennsylvania

PRESIDENT COOLIDGE, in his message to Congress, pointed out the rapid growth which is taking place in aeronautics. This growth is almost entirely due to the contract air mail service, under the law which I had the honor to sponsor in the 68th Congress.

Under that law daily flying is now 15,000 miles and is expected to reach 25,000 in a few months. There is a network of these routes now and it is hoped that every large city in the United States will soon have a place on one of them.

Success in this great new agency of communication will depend upon popular support. We have definitely avoided the subsidy plan in our legislation and payments for the carriage of mail by airplane must come from revenues.

At present there are 15,000,000,000 letters being carried by the United States Postal Service. If one per cent of these were sent by air mail, it would mean a fund of approximately $12,000,000 for the companies engaged in the work. That fund would spell success for the air mail routes and would mean continuous development and progress in commercial aviation. Can we not expect that every American will send at least one out of every hundred letters he mails by air mail?

Such support will mean more for aviation than the appropriation of many millions for war and navy aviation. It will mean a self-supporting, developing industry, rendering splendid service in time of peace and available at all times for national defense.

Another phase is important, and that is the transportation of foreign mail by aircraft. I have introduced a measure authorizing the Postmaster General to contract for the carriage of such mail after advertising for bids. The award shall be made to the lowest responsible bidder. Such a service will be of great value to the business interests dealing with Central and South American countries. It will assure speedy communication with those markets which are naturally ours, but which have been served heretofore largely by European countries on account of their better means of communication.

I feel assured that this measure will be adopted by Congress and will prove its value.

All in all, the future is rosy for aviation development. The strides made in the last few years will be exceeded in the next few years. The nation which gave the airplane to the world will take the place it rightfully deserves—world leadership in the industry of Langley, Wright brothers and Lindbergh.

Upper Air Charts

The first edition of a "Pilot Chart of the Upper Air," in the region of the North Atlantic Ocean has been issued by the Hydrographic Office, and monthly issues will be made until pilot charts for a year have been compiled.

The December issue is an experimental chart based on air data compiled by the Weather Bureau and correlated by the Navy Hydrographic Office. The information was obtained from 19 observation stations; four on the mainland of Europe, one at the Canary Islands, three in the West Indies and eleven in the eastern part of the United States.

This edition is the beginning of a service which it is hoped will be built up by additions from all possible sources in order that in the future, when trans-Atlantic flight schedules can be arranged, these charts will have the same value as the pilot charts now issued to mariners by the Hydrographic Office.

The charts show what is considered as the most practicable trans-Atlantic route for the month of December, in view of distances, temperatures, favorability of wind of general weather information, gleaned from analyses of recent trans-oceanic flights and the present development of aviation. The route to Bermuda, Bermuda to the Azores, and then from the Azores to Portland, England, is the most northerly route recommended for the month. As the pilot charts for the more advanced warmer months come out, study will be made taking into consideration distances, wind, temperatures and fog, the earliest time when the flight from New York to Europe over the great circle or via Newfoundland and the Azores is practicable. Distances, wind and accessibility of anchorages have been the determining factors in the selection of routes, each of which must be considered in the light of the particular aircraft selected for the route.

Since this chart covers but one month and is the first of the series to be produced, it is impossible to make comprehensive comparisions, either monthly or seasonal, or to determine what period or area should be covered until the series covering a full year has been completed. It is contemplated that as sufficient data covering other areas becomes available, to publish similar charts for those areas.

Airline distances between centers which are contemplated as bases of operations for trans-Atlantic aviation service are shown on the chart. Wind diagrams at the levels of 10,000 feet, 5,000 feet, 2,500 feet and at the surface are shown on the chart. Pressure and air temperature, sea and air temperatures, percentage of foggy days; types of storms with their paths and the daily rate; currents; routes for seaplanes and steamer routes; observation stations are marked for this region.

Club News

Clubs are invited to correspond with Popular Aviation and keep us informed as to their activities. It is our hope to make Popular Aviation the medium for the exchange of both ideas and news between the amateur aero clubs of this and other countries.

Peoria, Ill.

The Peoria Aero Club is leading the way for aviation enthusiasts in central Illinois, recently formed. It started out with a slogan of "100 Members Who Want to Fly." The newspapers of Peoria have assisted with splendid publicity and the club is making great progress. The officers are Louis Davis, Jr., president; Al Stott, secretary and treasurer; Herbert Daniels, assistant secretary and treasurer, and Oscar Hoerr, vice-president.

Flatbush, N. Y.

At a meeting at P. S. No. 135, Flatbush, Brooklyn, the Flatbush Aero Club was organized November 26. Its officers are: Milton E. Jongberg, president; Allen Seaberg, vice-president; J. Bertram Jongberg, secretary, and Arthur R. Parker, Jr., treasurer. Arrangements have been made with the local radio station to broadcast a series of aviation talks which at the same time will start a membership drive.

Richmond, L. I.

One of the most active air units sponsored by the A. S. P. A. is the Aero Club of Richmond, L. I., recently formed. At its organization meeting, Lieutenant John E. Heywang, president of the Bronx Aero Club, officiated and started the boys off on the right "foot." The officers elected were: Lieutenant Benjamin Perricone, president; Lieutenant John Battle, pilot instructor; Vincent Klemmer, vice-president; Anthony Bitteti, secretary, and Gordon Hamilton, treasurer.

Philadelphia

Under the guidance of D. G. Hendrickson as president, Blair Murphy, secretary, and E. M. Doherty, treasurer, the Philadelphia Aero Club is making splendid progress. The A. S. P. A. has forwarded to Philadelphia a list of members in the club vicinity, and from reports, members are signing up so fast the club will soon have to call "halt" and reorganize their initiation fees and dues. Plans are under way for the purchase of an aeroplane so that early in the spring the Philadelphia Aero Club members will begin to actually "take to the air."

Bayonne, N. J.

At a meeting held in the law offices of S. Melville Hussey, the Bayonne Flying Club of Bayonne, N. J., was organized and plans made for securing flying facilities in Bayonne. The meeting was addressed by Thomas L. Hill, president of the A. S. P. A., who told of the work that was being done in other communities, and who outlined methods of procedure for the Bayonne club to follow to achieve the best results. An election of officers will take place at the next meeting.

Worcester, Mass.

The newly organized Worcester Aero Club of Worcester, Mass., has changed its name to the Worcester Society for Promotion of Aviation, in conjunction with the A. S. P. A. The way this organization has started off is a mark for other ambitious clubs to "shoot" at. In three weeks they have secured 82 "paid-in" members, and will no doubt have a number of planes in operation in the new Worcester Airport early this spring. The officers of the club are: James Dickinson, secretary, and William C. Sylvester, president. Mr. Whittall of the Whittall Carpet Company, whose family has been prominent in New England for many years, is a member of the club. He is at present the owner of a Fairchild and a Waco plane.

Brooklyn, N. Y.

Under the leadership of Lieutenant R. Noble Estey, Lieutenant Joseph Aimee, Frank Flors, Harry Johnson, Edward Cox, and others interested, the Greater Brooklyn Aero Club was organized at a meeting held in Brooklyn. This organization was called into being at the repeated requests of Brooklyn residents that the A. S. P. A. work to have a Greater Brooklyn unit organized for those interested in Brooklyn, in order that they might participate in the local work.

Delhi Light Airplane Club

A light airplane club will be formed at Delhi, India, in the near future, according to the Times of India, states the Transportation Division, Department of Commerce. It is reported that it has been agreed that when organized the club should be federated with the Aero Club of India and with other light airplane clubs in India.

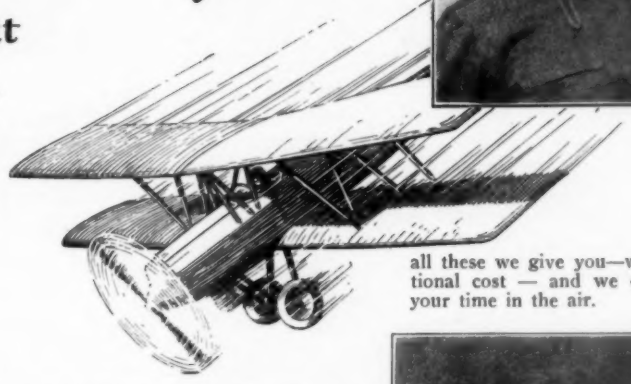
It is proposed that the club will provide facilities for flying and for granting flying certificates to its duly qualified members. According to the journal, the government is expected to make a liberal grant to the club to start with, in addition to two light airplanes, spare engines and hangars. The grounds adjoining the Gymkana Club at Kingsway (Old Delhi) and the adjoining Old Fort outside Delhi Gate have been suggested as an airport but until the creation of a full-fledged airport it is suggested that the Royal Air Force aerodrome in New Cantonment may be placed at the disposal of the club. According to the Times, two more light airplanes are expected from patrons of the club.

Honorary Colonel

Air adventurers and members of the A. S. P. A. have just cause to feel proud of its youngest member, Miss Cozette Parker, who recently flew alone from Anderson, Ind., to Kankakee, Ill., a distance of 132 miles. Miss Parker was made an honorary colonel of the A. S. P. A.

(*Continued on page* 68)

ZOOMING! *to* Fame *and* Fortune *in* Aviation



by R.J.Bassett

Chief Pilot

Aviation is calling the young men of America—millions are being spent in this newest industry—the greatest of all. Opportunities are open—limited only by the ability of the men to fill them. Never before has the chance been so great—never before has an opportunity existed that can compare with the opportunities in this new, fascinating, well paying profession.

Learn to Fly by Flying

Now is the time to get in. There is only one way to learn to fly—by flying. No book, pamphlet or course written will make you an aviator—no book or course can qualify you for a job in aviation. The Chicago Aviation Company teaches you to fly by flying. From the minute you enroll, you are taken in the air. You learn the feel of the ship—you learn how to operate, repair and rebuild water cooled and air cooled motors, vertical, V, and rotary types.

America's Finest Flying School

Come to Chicago, America's flying center. At our field you meet the world's famous pilots—you see every development in commercial aviation. The field is lighted for night flying. You learn on 1927 Alexander Eaglerock planes inspected by the U. S. Government. Our pilots are thoroughly experienced—every man carries a transport license. For thoroughness and efficiency, there is not a course that can compare with ours. Our welfare department assists you with your housing and employment problems—yet despite these exclusive advantages our tuition is the lowest.

YOU LEARN ON THESE SHIPS

YOU LEARN AT THIS FIELD

Unlimited Flying Time

Our school is the only one giving you the exclusive advantage of unlimited flying time. You cannot hope to be a pilot with just a few lessons—it takes practical experience—you must have cross country flying, cloud flying, engine spirals, spins, side slips—all these we give you—without additional cost — and we do not limit your time in the air.

BIG FREE BOOK "HOW TO FLY"

I have written a book—it tells you how to break into aviation and gives you valuable information—information you should have if you are considering this field. You will find that it is not only a gold mine of information but a time saver and money saver as well. The first edition I am sending out without charge. The supply is limited to books now on hand. A copy is being held for you—fill out the coupon today to make sure of securing yours without charge.

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Chicago Aviation Company

737-745 S. Clark St., Chicago, Ill.

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Chicago, Illinois.

Gentlemen: I am interested in Aviation. Please send me a copy of your Free Book "How to Fly."

NAME_____

ADDRESS_____

TOWN_____ STATE_____

Yes, But Have You Heard—

THAT J. R. Henderson, of Chicago, has made plans for a flight from Ottawa, Canada, to Rome, in a Ryan?

THAT while American aviators cannot be accused of being dummies the French are using wax works of Lindbergh, Byrd and Elder for clothing displays?

THAT the first two Siskin single seater scout planes for Canada's military air force are now in use?

THAT Maj. Gen. Fechet put on a show at Mitchel Field the week after becoming chief of the Army Air Corps, to let the kee-wees know he is not a desk executive in spite of his travelling desk plane?

THAT when Mussolini learned that Bellanca was building a plane for the King of Italy at Arlington, he made it known that he would probably order two for himself?

THAT Ireland plans the establishment of a department of Civil Aviation with Col. Charles Russell in charge?

THAT Joe Donnellan, of St. Joseph, Mich., says he has backing for a 16,000-mile flight from Chicago through Central and South America and return?

THAT the new Sikorsky bomber had its test at Curtiss field and was piloted by Leigh Wade, who is now a test pilot for Consolidated Aircraft Corporation of Buffalo?

THAT business interests of Panama may force a change in the military regulations which prevent flying over the Canal Zone?

THAT some of those who ought to know claim that Western Air Express have purchased three tri-motored sixteen-passenger Fokkers for the San Francisco-Los Angeles run?

THAT Congress is considering asking the Secretary of State to lift the embargo on aircraft shipments to Mexico?

THAT the Pan-American Airways, operating the mail service between Key West and Havana, will put trimotored cabin monoplanes in service for passenger traffic?

THAT the Fairchild Aviation Corporation has consolidated its seven subsidiaries under one holding company and is erecting extensive buildings at Farmingdale, L. I.?

THAT the Post Office has now let contracts for air mail from Atlanta to Miami and to New Orleans?

THAT daylight air mail service will start soon between Buffalo, Schenectady and Albany?

THAT another winter ocean-hopper has made his appearance in the person of Cesare Sabelli, whose backers say he will fly a Bellanca to Rome and then back to New York?

THAT the Standard Oil Company (Indiana) have a Laird Whirlwind job now to use as an auxiliary to the big Ford-Stout.

THAT during the holidays the greatest increase reported by any branch of the Postal Service was in air mail?

THAT Loening Aeronautical Corportion is now producing commercial amphibians similar to the planes made for the Government?

THAT Charles A. Levine has a factory in Long Island City and plans to start manufacture?

THAT the Rumanian government has ordered 400 American silk parachutes?

THAT Admiral Moffett admits we have the best naval aviation in the world?

THAT Travel Air is doubling its factory at Wichita and that Wichita reports its regular winter crop of new aircraft companies?

THAT Clyde Cessna's new strutless cantilever monoplane made 144 miles per hour on test?

THAT the government has just awarded a contract to the Hall Aluminum Corporation of New York for an all-metal experimental biplane, together with design information, technical data and drawings, at a total cost of $131,512?

THAT the Navy is buying 25 PN-10 flying boats from the Douglas Aircraft Corporation of Santa Monica, Cal.?

THAT plans for the two new Navy dirigibles include devices for carrying and releasing six or eight airplanes while in flight?

THAT the Bureau of Aeronautics, Department of Commerce, has decided not to license war surplus planes if wings have been clipped or any structural changes made?

THAT the Mile-High Aviation School has started operations at Denver as a subsidiary of the Rocky Mountains Airlines, owner of one of Denver's airports?

THAT two aviators seeded a 1900 acre tract in Oregon to grass in ten hours' flying time at a cost of 50 cents an acre, compared with $1.25 for hand seeding?

THAT the Aeronautical Mechanics Association hast been formed at Garden City, L. I., and any mechanic interested may get information about the association and its purposes from John G. Smith, the secretary?

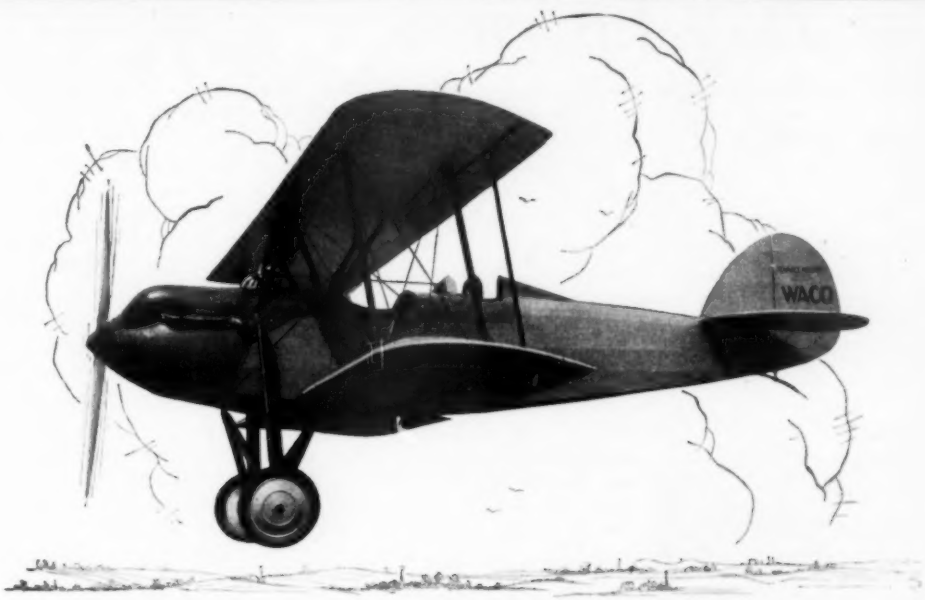
THAT air mail saved one bank in Wichita, Kansas, $1,144.27 net in six months?

THAT Basil Russell of Portland is going to take another crack at the OX 5 altitude record and this time will have a barograph with him?

THAT wind tunnel tests of the new Falcon sea plane showed it to be slightly faster than the same plane equipped with land gear?

THAT the Commercial Aircraft Sales Company, 644 Diversey Parkway, is now the exclusive distributor of Lincoln-Page planes for Illinois and adjacent parts of Indiana and Wisconsin? The first ship was flown into Chicago from Lincoln on Christmas Day.

Picked Up in the Hangar



Airplane Performance Traditional With WACO

WACO performance and dependability are traditional —wherever you've heard airplanes mentioned—whatever you've heard about them you've never heard anything but praise for the performance and dependability of the WACO.

There is nothing untried, unproved, or in any way experimental about the WACO. It embodies the engineering principles gained in the ten years of airplane construction.

Take the stick of this acknowledged leader and feel for yourself the almost arrow-like take-off and quick climbing ability. Give her the gun and feel the thrill of its speed. Set her stabilizer and fly with hands off. Bring her down and land on the cushion-like hydraulic shock absorbers without the slightest jolt or jar. When you have done this you will realize why everyone that has seen the WACO is acclaiming it as the outstanding leader.

Write us for booklet giving complete details and price together with the name of our distributor nearest you.

WACO AIRPLANES
MANUFACTURED BY ADVANCE AIRCRAFT CO., TROY, OHIO

There are more WACO Airplanes streaking through the skies than those of any other make. The Air-Wise know the reasons - - - -

The unusual performance that The WACO Organization has been able to obtain from the OX5 motor—quick take-off, fast climb, unusual top speed.

The unusual comfort that has been built into the pilot's and passengers' compartments.—

The hands off flying stability made possible through adjustable stabilizer which can be securely held in any position.

The more than necessary safety factor which is built into the entire ship.

The shock absorbing landing gear which straightens out the bumps on landing.

The all-over beauty of design.

The ten years of aircraft experience that are behind each WACO that takes the air.

Approved Type Certificate No. 13

One Day Instruction

AN interesting experiment in flying instruction was carried out recently at Lunken airport, Cincinnati, by instructors of the Embry-Riddle Flying school.

Frank W. Shelton, Jr., a fourth year student at the University of Cincinnati, was taught to fly in one day, his exact time being 5 hours and 34 minutes. Homer Rader and Warren Vine, members of the Embry-Riddle staff of instructors, alternated in teaching Shelton, who kept hard at the job all day long and made a perfect solo flight.

Frank W. Shelton, Jr.

Shelton was selected by a popular voting contest at football game between the University of Cincinnati and Transylvania college. Previously, the coach had selected 10 young men whom he considered physically competent to withstand the strain which such a test would undoubtedly entail. Then their names were printed on the football program and the winner announced. Another candidate received two more votes than Shelton, but he failed to pass the usual examination required by the department of commerce for a student pilot's license. Shelton was the alternate and he passed the examination easily.

Were it not for the fact that he was of an unusually high type, his instructors said, the experiment would have been a failure. As it was, several delays throughout the day so cut down his time that he was obliged to solo after the sun had gone down 30 minutes.

The first flight provided the real thrill of the day. At a height of 2,000 feet in the first flight that Shelton had ever made in a plane, the motor stopped, and Rader was obliged to glide down in a "dead stick" landing. Thereafter, it was take off and land and take off and land throughout the day.

By noon, when Shelton took his first rest and had lunch served on the field, he had made 23 landings under direction and observation of his instructors. By 3 o'clock, he had made 40 landings and at 4, the number was 53. His 74th supervised landing was made at 6:04 and Rader stepped out of the plane and sent him around alone.

His air work on the solo was perfect, according to Rader and Vine and when he came in for a landing, he touched wheels and tailskid exactly at the same time in a perfect three-point landing.

By that time, the sun had sunk behind the Kentucky hills and Lunken airport was in deep shadow. Shelton wore tinted goggles which further lowered his visibility, but he maneuvered the ship in exactly the proper manner for a good landing.

He was congrautlated by T. Higbee Embry and John Paul Riddle, president and general manager respectively of the Embry-Riddle company and Raymond D. Harris, head of the Embry-Riddle Flying school. After he has had an hour's solo flying in the company's ships, he will purchase his own plane, in partnership with a school friend, and invade the West to make enough money next vacation to continue his studies at the university where he is trying for a degree of M.D. His destination in the West is Independence, Kan., where he was born and where he plans to carry passengers in his new plane.

Shelton in the cockpit—Homer Rader at the left.

He will get his time at the Embry-Riddle school to qualify him for a limited commercial pilot's license.

As far as is known, Shelton is the second man ever to be taught to fly in a single day. A similar experiment was conducted at McCook field, Dayton, where the student was "soloed" after 6 hours' instruction. This makes Shelton's course a world's record if the records are complete. No effort was made, however, to break a record, and no practical value is attached to the experiment, Harris said. It was done merely to prove that learning to fly is not as difficult as the general public has come to believe.

Plugs Oil Leak

While making observations of some I. W. W. meetings from an altitude of about 100 feet, the tachometer plug in the camshaft housing of the plane piloted by Lieut. Ralph J. Hall, A. C., Colorado National Guard, came out, permitting the oil to escape. Realizing the dangers of a forced landing under the conditions then present, Lieut. Wilson, observer, climbed out of the rear cockpit and worked his way forward to the motor. He then held his thumb in the hole from which the oil was running, while the pilot returned to the field, a distance of about thirty miles, and which was reached with an altitude of about 2,500 feet. Lieut. Wilson then climbed back into the cockpit while the motor was throttled, and the pilot was able to make a normal landing before the remaining oil escaped.

For several weeks the Colorado National Guard Air Corps was patrolling the Colorado Coal Fields in connection with the strike and the I. W. W. activities in those fields. Most of the flying incident to this duty was over mountainous country above the 6,000 foot level.

ATTENTION!

Aviation Schools

A great many aviation pilots and mechanics' schools have recently placed orders for motors, wings, propellers and instruments which I carry in stock and special prices to these institutions. INVESTIGATE!

For the Aeroplane Owner and Operator

Hispano A 150 H.P.	$350.00
Curtiss OX5	275.00
Renault 80 H.P.	175.00
Hispano E 180 H.P.	600.00
Wright Whirlwind cylinders with valve springs, complete J4B	35.00
Complete planes	600.00 up

For the Sport Plane Builder

Heath Parasol monoplane wings (new and covered) crated	$ 30.00
New Lawrence 28 H.P. motors	125.00
Gnome 50 H.P. Sport plane motors	100.00
Propellers for small engines	15.00

For Ice Sled and Snow Sled Builders

Gnome 165 H.P. 9 cyl. engine	$ 40.00
Le Rhone 120 H.P. 9 cyl. engine	65.00
Le Rhone 80 H.P. 9 cyl. engine	125.00
Curtiss V23 200 H.P.	175.00
Clerget 135 H.P.	150.00
Propellers	15.00 to 75.00
2 Pairs Aviators goggles, postpaid	1.00

Write for complete booklet. Include postage.

MARVIN A. NORTHROP

730 Washington Ave., North **Minneapolis, Minn.**

Foreign News & Notes

British Extend Air Lines

PLANS for the extension of British Air services to other parts of the empire and to foreign countries, using both airplanes and airships, are going forward and the progress made in this direction up to the present offers an encouraging outlook.

About 2,500 miles of air routes were in regular operation by Great Britain this year. In 1927 there were 4,777 machine flights made on regular services. These craft covered 840,000 miles, carrying 16,775 passengers and 679 tons of cargo. The value of commercial goods carried by air across the English channel last year amounted to $10,000,000.

Always dependent upon transportation, the British determined to lead in the development of civil aeronautics to maintain their position in the commercial and industrial world. Air transportation is not used extensively within Great Britain because the distances are short and rail and water transportation have been highly developed.

The operations of British air services were extended across the English channel to continental centers in 1919 only to meet destructive competition from subsidized French companies. Since then British air transport has been subsidized. Four companies received direct aid prior to the formation in 1924 of the Imperial Airways, Ltd. This company was given a monopoly of British-aided civil air services in Europe.

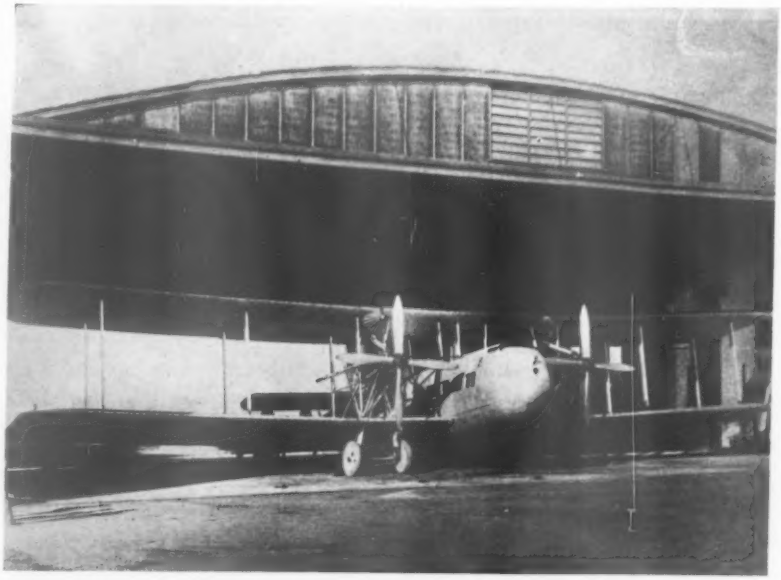
The British Government has provided to date approximately $17,000,000 for the promotion of air transportation. The Imperial Airways are operating under a subsidy of $5,000,000 extending until 1934. More than half of this amount already has been paid to the company. This subsidy is not a gift. It is repayable when the company shows a profit but development of air services has preference over repayment and no profits have been made up to the present time.

Since the introduction of the policy of the Government to support one company instead of supporting several small ones, the services have been nearly stabilized. They extend over 2,500 miles of routes in Europe and the Near East. The principal route is that between London and Paris, over which there are three Imperial Airways flights in each direction daily during the summer months. Without extra charges a service de luxe known as "Silver Wing" is operated daily, including Sunday, on this route.

A daily service is provided between London and Zurich via Paris and Basel during the summer months when tourist traffic is heavy. The company cooperates with the Belgian company "Sabena" in providing daily service between London and Brussels via Ostend. The company's planes operate regularly between London and Cologne via Brussels, and a seaplane with two engines is operated once in each direction weekly between Southampton and the Island of Guernsey, 118 miles. Quick connections with other services may be made so that travelers may reach distant points rapidly by air, or by air and rail. A 12-passenger seaplane service between Southampton and Cherbourg is planned to accommodate mails and passengers late for steamers.

The company opened its service between Cairo, Egypt, and Basra, on the Persian Gulf, a year ago. The new service makes it possible to travel between London and Basra in 8 days, compared with 23 days by sea. It is hoped to extend this line to Karachi, India, in a short time. Experimental flights have been made with seaplanes in Egypt along the White Nile with a view to providing regular service to the heart of eastern Africa. Other plans are under way for connecting important centers of the British empire.

Particular interest attaches at present to Great Britain's airship program.



Giant Vickers biplane used in Continental passenger service at the hangar, Croydon, England.

The development of airships has lagged behind that of airplanes, but it is believed that the lighter-than-air craft will play an important role in the British imperial air transportation system. The two 5,000,000 cubic foot airships have undergone numerous changes in design as work progressed but are now nearing completion. An airship shed is being erected at Karachi, India and the mooring masts at Karachi, Ismallia, Egypt; and Cardington, England, are completed. It is reported that a site for such a mast has been selected in Canada.

Pilgrims by Plane

A dozen airplanes capable of carrying 20 passengers each to transport pilgrims to Mecca and to Jerusalem are wanted by the Hedjaz Pilgrims Transport Agency of India, whose managing proprietor has written the U. S. Department of Commerce at Washington, D. C., expressing his desire to charter that number of planes for use in April, May and June of next year.

According to the proprietor's letter to the Department the lack of railroad transportation and good automobile roads in Hedjaz would make the air service very welcome. The camel transportation, he says, is very difficult from Mecca to Medina and to Jerusalem. The proposed service would carry pilgrims to Mecca from Jedda, from Mecca to Medina, and from Medina to Jerusalem.

Light Planes in France

Impetus to the development of light airplanes has been given by the French Department of Commerce, which recently instituted three contests for light planes of different classes, in an attempt to overcome the apparent neglect in the development of this type of aircraft.

The first entrant for planes of less than 400 kilograms (882 lbs.) was the French pilot Finant, who, with a passenger, flew a closed course of 1,150 kilometer (815 miles) in 11 hours and 15 minutes. The airplane was a Caudron Avionnette C-109, equipped with a 40 horsepower Salmson air-cooled engine. This was a world's record for planes of that class. The very next day, Finant, with his wife as a passenger, broke the world's record for straightaway flight for planes of the 882 pound class, by making a nonstop flight from Paris to Berlin.

Persian Winter Service

Persian air service will be continued during this winter. Suspensions which may be forced upon the operators by weather conditions will be temporary, according to operating company's announcement, says a report from Consul Augustin W. Ferrin, Teheran, to the Department of Commerce. During the third quarter of 1927, the company's plane, carrying four passengers, has flown filled to capacity on every flight in the weekly service between Tabriz and Teheran, Persia. The rate per passenger is equivalent to $35. An additional plane may be added to the Persian service next spring, it is said.

Indian Airdrome Chain

The Indian Government is planning to construct a chain of airdromes throughout India along the route from Allahabad to Calcutta via Benares, Gaya, Asansol and Dum Dum, according to a report from Vice Consul Richard R. Wiley, Calcutta, made public by the Department of Commerce.

As a result of the recent interest taken in India in civil aviation, the government has decided to organize the necessary land establishments and it has the intention to ultimately have a landing ground in every cantonment in India the report states. Sites for airdromes are also to be selected at Cawnpore and Lucknow, according to the report.

Spring deliveries and the scarcity of OX5 motors

Brand new OX5 motors are becoming scarce. Two years ago they could be purchased for $100. Now try to buy one for less than $500.

A $500 deposit on an EAGLEROCK for Spring delivery assures you of a brand new OX5.

OTHERWISE

—you may have to pay as much for a new production motor alone as you would for a complete EAGLEROCK.

ALEXANDER
EAGLEROCK
Cash $2750 Denver
or may be purchased on Time Payments

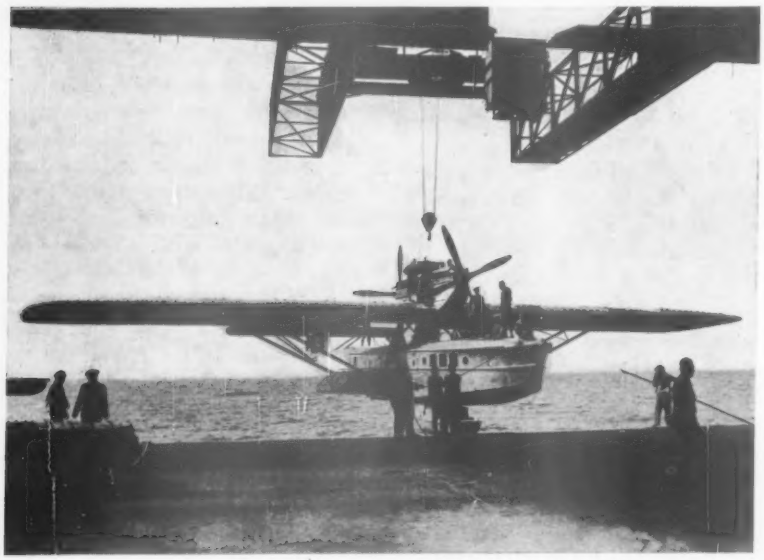
ALEXANDER AIRCRAFT CO.

Room 420, Alexander Industries Bldg., Denver, Colo.

Increase in price is due to additional features in standard equipment—dual control, streamline headrest, side door and Berling magneto.

Sixty Passenger Seaplane

A giant seaplane which can carry sixty passengers has just been completed by the Dornier Works at Friederickshafen, Germany. The plane



is of the same type as that used by Amundsen in his Polar Flight and by the Italian flyer Locatelli in his long distance flight. It is a larger edition of the Dornier-Wahl used by Captain Courtney.

The monoplane is motored by two engines, operating a pusher and a tractor propeller having four blades each. The engines are mounted in a housing above the single wing, while the cabin and the flying control compartment is in a boat shaped structure that is hung from the main plane. The horizonal tail stabilizing surface is very large, acting almost in the capacity of an additional plane. There are side floats to make the entire craft more stable when landing or floating on the water.

The ship is expected to carry a full load at a cruising speed of approximately 100 miles per hour, with a maximum speed of 112 miles per hour.

Argentine Air Mail

Negotiations for the transfer of Argentine mail for the United States to air mail planes immediately upon arrival in New York City are being carried on, the Director-General of the Argentine Postal Service announced recently, reports Assistant Trade Commissioner Mason F. Ford, Buenos Aires, to the Department of Commerce. It is reported in Argentina that arrangements will have been completed and the service started by next month.

Poland's Service Improved

Plans for extending and improving Poland's air services during 1928 are under consideration by the Ministry of Communications, reports Assistant Trade Commissioner Gilbert Redfern, Warsaw, Poland, to the Department of Commerce. The Danzig-Lodz line is to be extended to serve Katowice, and new services between Warsaw-Katowice, Danzig-Posen (Poznan) and Posen-Lemberg (Lwow) are to be inaugurated. The new Warsaw-Katowice line will connect at Lodz with the Danzig-Katowice service. Two important "trunk line" extensions over Poland are also contemplated; namely, from Berlin to Moscow via Posen, Warsaw and Vilno, and from Lemberg to Angora via Bucharest and Constantinople.

It is further announced that the 1928-29 budget of the Ministry of Communications will provide several million zlotys (1 zloty equals $0.11) for the construction of new airports at Posen and Vilno, and for the improvement of existing stations at Warsaw, Lemberg and Rakowice (near Cracow). It is proposed to equip all these airports with underground gasoline tanks and meterorological stations, and also with short-wave radio broadcasting stations. Emergency landing fields will also be provided in due course along the principal air lines. Commercial aviation services with Poland are provided mainly by "Aerolot," which operates under a government subsidy.

Mexico Grants Concessions

Concessions for air services from Mexico City to a point opposite Brownsville, Texas and to the Guatemalan frontier have been granted by the Mexican Department of Communications and Public Works, states a report to the Department of Commerce from Acting Commercial Attache George Wythe, Mexico City.

The Mexico City-Brownsville service, according to the concession granted to the Compania Mexicana de Aviacion S. A. will be via Tampico. The Mexican Pan American Airways S. A., of Mexico City, has the concession between Mexico City and a point on the Guatemalan border and the route is expected to be via Puebla, Tehuacan, Oaxaca, San Jeronima, Tuxtla Gutierrez, San Cristobal and Comitan. Mexican army landing fields will be used.

Italian Air Traffic Doubles

Italian air traffic was larger during the first six months of 1927 than that during the whole of 1926, reports Assistant Trade Commissioner D. F. Spencer, Rome, to the Department of Commerce. Almost 340,000 miles were flown the first half of this year compared with about 325,000 miles in 1926.

Hours flown, number of passengers and amount of freight increased correspondingly. Flying hours the first half of this year totaled 4,121 compared with 3,524 in 1926; local passengers numbered 5,653 compared with 5,142, through passengers 3,985 compared with 3,991, and freight 54,125 kilograms, about 24,500 pounds, compared with 40,907 kiograms or about 18,200 pounds.

Trip regularity, according to official figures, was much improved over last year. In 1926 the percentage of regular trips made was 83.77 while in the first three months of 1927 it was 96.84 per cent.

Causes contributing to irregularities of flying in 1926 were as follows: Un-

favorable atmospheric conditions, 13.45 per cent; damage to planes 0.72 per cent; defects in motors 2.06 per cent. In 1927 these hazards were reduced as follows: Unfavorable atmospheric conditions 4.81 per cent; damage to planes 0.14 per cent; defects in motors 2.21 per cent.

Helsingfors Service Closes

All air communications between Helsingfors and other points were temporarily discontinued for the winter recently, reports Acting Commercial Attache F. B. Lyon, Helsingfors, to the Department of Commerce. The last service to close down for the year was the Helsingfors-Reval traffic. The service between Helsingfors and Reval will reopen on January 15, ice conditions permitting. It is expected that the Stockholm-Helsingfors planes will reenter the service some time during May, 1928.

The directors of the Finnish company at Helsingfors are well pleased with results obtained and progress made during the past flying season. The Helsingfors-Reval line which opened on January 19 carried a total of 1,542 passengers during the season. The trial flights on the Helsingfors-Riga line started on August 10 and discontinued 30 days later proved to be successful, having carried 81 passengers, 911 kilos of freight and 74 kilos of postal matter. The Helsingfors-Stockholm service has also developed very satisfactorily. In 1924 this service was opened and during that year 192 passengers were carried; in 1925, 436 passengers used these planes; in 1926 the passengers totaled 782 and in 1927, 1,302 passengers took advantage of this service.

It is planned to make two trips daily from Helsingfors to Stockholm during the coming season. The first plane will leave Helsingfors at 8 o'clock in the morning and the second plane at 3 p. m. It is said that a larger plane will be purchased, capable of accommodating 17 passengers and with place for 1,000 kilos of postal matter.

Special Freight Service

Now European air transport companies have found it necessary to handle passenger and freight traffic separately as is being done on railroads—such has been the progress in air transport. The Deutsche Luft Hansa plans to introduce this special air freight service next spring. The route will be established between Berlin, Paris and London with stop-overs at Hanover and Essen. Freight planes will leave the Tempelhof air port in Berlin at night, so that the freight can be delivered to the firms in Paris and London on the following forenoon. On October 1 a co-operative railroad-air service was introduced for German mail and the special freight service will also take advantage of this facility. A good slogan for the Deutsche Luft Hansa or any other air transport company would be this: "If you want to move it fast, move it by air."

Classified

WANTED—Seaplane, new or used, for cash. Also send bargain lists of planes and parts. R. Malmgren, 3030 Wilton Ave., Chicago, Ill.

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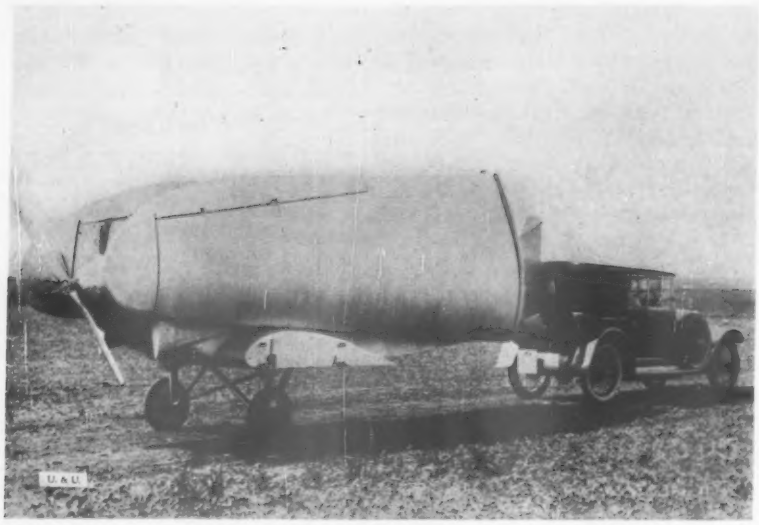


German Flivver Plane

The popular, low-priced, low-wing monoplane presents no problem of storage to the German aviation fan. This small plane is of the folding wing type and is easily disassembled for hauling to and from the flying field. A projecting pin at the tail fits into a socket on the rear of an automobile so the plane can be taken down an ordinary street. Wings and elevators come off and fit close against the fuselage. Simplified locking devices make assembly a matter of only a few minutes.

Panama Route Practical

On the heels of the non-stop flight from Washington to Mexico City made by Col. Charles A. Lindbergh, comes the assertion by Assistant Secretary of the Navy for Aeronautics, Edward P. Warner, that the establishment of commercial air routes with the use of flying boats from the United States to the Canal Zone and all Central American ports should be entirely practicable.

An intensive study of weather conditions prevailing along a route from Key West, Fla., to the Canal Zone and all Central American ports, including the West Indies, made by the Hydrographic Office of the Navy Department, acording to Mr. Warner, has proved the practicability of such travel by flying boats. This research, Mr. Warner explained, was undertaken with a view of stimulating interest in the establishment of such services by commercial companies in this country.

It was pointed out by Mr. Warner that the Navy has taken cognizance of the value of the flying boat type of plane both commercially and in a military way. Bids already have been invited and received for 25 flying boats of the PN-10 type, which would have a cruising radius of 3,000 miles and a speed of 100 miles an hour, he said, and the Navy shortly will award contracts for about twenty of these craft. In addition, he declared, the Navy also is negotiating for an entirely new type of flying boat that will differ from any yet constructed, and which is intended to replace the last of the war-time flying boats now in service.

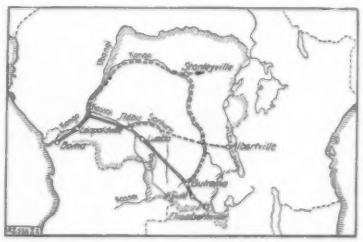
In connection with the receipt of bids for the 25 flying boats of the PN-10 type, it was stated at the Bureau of Aeronautics that seven bids have been received and ranged from approximately $1,500,000, to slightly more than $2,000,000 for the entire consignment. These planes, under specifications drawn up by the Bureau, based on the experimental plane of the PN-10 type manufactured at the Naval Aircraft Factory at Philadelphia, would have a wing spread of more than 80 feet, and a regular gasoline capacity of 750 gallons. With armament removed, the fuel capacity would be 1,300 gallons.

According to Mr. Warner the value of the flying boat for commercial purposes, particularly along routes that necessitate over-water flying, has been greatly enhanced by the development of the radial type, air-cooled engine.

Central African Lines

The Belgians have only limited opportunities in their home country for expanding their air transport service, for their country is so small. Therefore they are putting considerable efforts in developing their air transport system in the Belgian Congo States, Central Africa, even though there is no direct air route connection with the home country. The route which is being maintained by the Societe Anonyme Belge d'Exploitation de la Navigation Aerienne (Sabena) connects the mouth of the Congo River with the copper mines at Katanga. The distance from Boma to Leopoldsville is 217 miles, from there to Luebo 528 miles, and from there to N'Gule another 528 miles.

The airplane has been found of exceptional advantage in the wilds of Africa because of the time it saves in travel. The distance from Boma to Leopoldville requires eight days to travel by the quickest means on land or water, but the airplane takes the traveler over that distance in only five

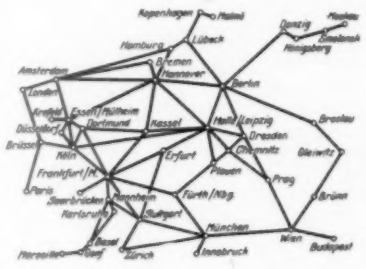


hours. The saving in time is even greater for the settlements further inland. The route was opened in June, 1925. By the end of that year 31,000 miles had been covered. From Jan. to Nov. in 1926, the planes covered 85,749 miles.

The transport company uses British-built planes. The equipment in July, 1927, consisted of eight three-motor planes of the Handley Page W. 8 type, and three one-motor planes of the De Havilland D 50 type. Of these three three-motor and one one-motor planes are kept on reserve. The accompanying map shows the present and projected air transport routes; those that are projected are indicated by the dotted line. When the project is completed, the air transport system of the Belgian Congo States will measure 4,660 miles. Later an extension is planned to the Nile and the Tschad-Sea.

German Winter Schedule

The winter flying schedule of the Deutsche Luft Hansa went into effect on Oct. 17 last. The winter air transport service is being maintained in co-operation with the International Air Transport Association (IATA). While last summer the air transport



was maintained on about 80 lines totalling 16,342 miles of route, about 45 per cent or 7,456 miles of route will be maintained during this winter. In 1926 the summer air transport covered 47 lines with 12,676 miles and the winter air transport 40 per cent with 5,065 miles of route. The winter flying schedule has been divided into two parts to conform more closely with the longer and the shorter days of the season. The longer day schedule holds good from Oct. 17 to Nov. 5 and from Feb. 6 to April 15, while the shorter day schedule holds good from Nov. 7 to Feb. 4. The map shows the winter flying routes of the Deutsche Luft Hansa and other co-operating air transport companies.

Contest in Light Planes

This fall, fourteen light planes participated in the Saxony Flight at Leipsig. Two of the planes, both of the Messerschmitt "M 19" type, had an actual weight of 142.55 and 138.35 kg. but a flying weight of 345.5 and 335.7 kg. respectively. The flying weight was therefore greater than the actual weight of the planes. In the flight these planes attained an altitude of 100 meters (328 ft.) above ground. Hempel climbed with a 20 hp. motor to an altitude of 3,800 m. (12,467 ft.). The "Sausewind," having a 60 hp. motor, reached an altitude of nearly 19,685 ft. The Messerschmitt planes attained a speed of 61 and 71 miles per hour in the 50-mile speed test, while the "Sausewind" plane attained a speed of 107 miles per hour. There was also a 284-mile distance flight. The light-motored light weight planes are becoming more popular among European civilian flyers.

Argentine Air Mail Service

An Argentine aviation company has completed an agreement with the Paraguayan Government to carry mail between Buenos Aires and Asuncion for a five year period, reports Trade Commissioner H. H. Tewksbury, Buenos Aires, to the Department of Commerce. Stops will be made at Rosario, Parana, Esquina, Goya, Bella Vista, Corrientes, Resistencia, and Formosa.

Three trips will be made weekly in each direction, planes leaving Buenos Aires and Asuncion on Monday, Wednesday and Friday. The flying time with stops at the points listed, will be 7½ hours. The new service will be operated in connection with the service planned by this company between France and Buenos Aires.

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Something New

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The sheriff's office and the police department now have three Hispano-Suiza planes and licensed pilots at their disposal for the pursuit of bank bandits in Gary, it was announced today by State Senator C. Oliver Holmes, president of the State Bankers' association.

The planes are owned and operated by the Calumet Air Transport company, incorporated, proprietors of the aviation field at Broadway and 61st.

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This offer is good only within a radius of 300 miles from Gary, Indiana, and if you live more than 300 miles from Gary, it will cost you 20 cents per mile extra, for all over 300 miles. The purpose of this offer is to give the student immediate experience, and he will thus save time.

Our famous ten hour flying course, together with ground course, in our field shop, including Aeroplane Transportation to Gary, Ind., $250.00 (within 300 miles radius of Gary).

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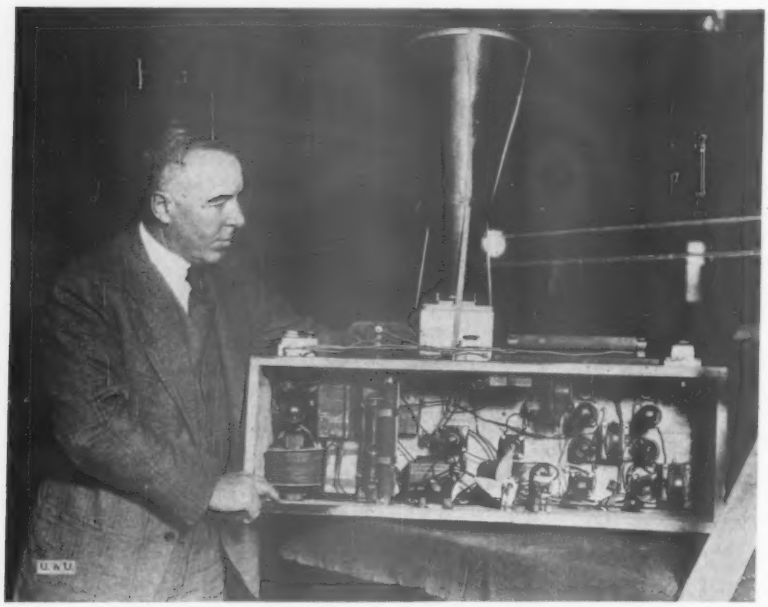
Science and Invention

Sound Switches on Lights

The research department of the Westinghouse Electric & Manufacturing Company has developed a device that detects airplanes flying within a radius of 1,000 feet by means of the motor sound. The apparatus, which was developed under the direction of S. M. Kintner, head of the resarch department, consists of a delicate microphone, shielded so that it is not affected by local ground noises, and a relay device, so that when the sound of a motor is picked up by the microphone the relays act to throw a switch which in turn lights the flood-lights so that the aviator may make a safe landing.



Chamberlin's New Plane

Colonel Clarence Chamberlin, New York to Germany flier, has a new ambition—an ambition to perfect a "fool proof" plane that any amateur, no matter how careless, can operate without assuming undue risks.

From the Ludington Philadelphia Flying Service, lessee of the Philadelphia Airport, Chamberlin has purchased a new twenty-five foot plane that embodies many of his safety ideas. The plane can take off after a sixty-foot run and can be landed after a seventy-five foot roll.

Not satisfied with establishing these records with the new craft, Chamberlin is out to "materially better them"—how much, cannot be said.

The plane was delivered late in October and Chamberlin, anxious to put it through exhaustive tests, made several trial flights at the Philadelphia Airport. Speaking later before the City Business Club he told what results had been achieved and gave a description of the new craft.

"I got into the air after a run of only sixty feet," he said, "and my ship rolled only seventy-five feet when I landed. I am not satisfied with those distances and I expect to materially better them in future trials.

"The plane comes down like a parachute, at a sharper angle that the usual flat, high-speed landing. It weighs only 500 pounds and has a Henri Farman undercarriage that checks the speed on landing and upends the nose of the ship at the take-off, according to the wishes of the pilot.

"This plane has a wingspread of twenty-five feet and its control surfaces can be enlarged in the air. That feature greatly increases the safety factors.

"I have seen admirable safety devices on other planes during my travels and my idea is to incorporate each of them in this new plane of mine until I have a perfectly 'fool-proof' craft.

"It has been said that while I might be able to accomplish a take-off and a landing within the limits of a short runway, other pilots would fail. The evident answer is that what I and a few others accomplish in a pioneering way will be accomplished and perhaps bettered as a matter of course by virtually every pilot within a short time."

Discussing the new plane, R. Sanford Saltus, Jr., vice-president of the Ludington Philadelphia Flying Service, said:

"The plane is a small biplane, built similar to the well-known Farman sport plane with certain modifications. Some of these are the rounded wing tips and a completely new tail assembly.

"The plane is a two-seater, but it has a special cowling which can be placed over the rear seat, making the ship a very attractive one-seater. The craft is equipped with a Siemens-Halske 50 H. P. radial engine. The wings are of the usual wood and fabric construction and the fuselage is covered with three-ply veneer and stained red.

"All metal parts are painted light blue and this combination gives the ship a smart appearance.

"The ship's performance is marked by a very quick take-off and a very short run after landing. Its stalling speed is very low due to its light construction. The ship balances with power on and power off and is remarkably quick on controls at both high and low speeds, so that for exhibition purposes and for a private owner's plane it has almost ideal qualities.

"The plane has a maximum speed of eighty-five miles per hour, it is nineteen feet eleven inches from propeller to tail, it weighs 475 pounds fully loaded, has a gasoline capacity of fourteen gallons, and averages between four and five gallons per hour.

"The wheels are mounted eighteen inches in front of the axle on a long skid and, when the plane lands, the

wheels are pushed up and the spikes on the tail are pushed into the ground, bringing the craft to a much shorter stop than would ordinarily be possible.

"We do not expect to manufacture more of these planes except on special order. At the present time I do not believe a market exists for them. Chamberlin, however, has always been interested in this type of plane and I believe he plans to manufacture them in quantities."

Many Worthless Inventions

Of 1,000 inventions and designs which have been submitted to the National Advisory Committee for Aeronautics during the past year only three were found worthy of favorable recommendation, although each received careful consideration.

Inventive genius apparently received a tremendous inspiration from Col. Charles A. Lindbergh's New York-to-Paris flight as inventions have poured in upon the committee in such large numbers since last summer that it has been necessary to enlarge the engineering and clerical staff.

It is conceded that the inventors have plenty of ideas and an explanation of their general lack of merit is seen in the fact that the main theoretical foundation of aeronautical science has been laid and that new advances must be more in the nature of extensions or additions to existing theory rather than new fundamental conceptions.

Radio Bands for Aircraft

Several radio wave bands have been assigned by the International Radio Conference for aircraft communication and air navigation. Aircraft services are permitted to use the band from 850 to 950 meters for communication; from 950 to 1050 meters for radio beacons and 770 to 830 meters for direction finding. Aircraft can also use other waves assigned to mobile ship and shore service, from 545 to 580 meters, 600 meters and several short wave bands below 200 meters.

New Patents

The U. S. Patent Office has just announced the granting of the following patents pertaining to aeronautics:

Michael Glowacki, Shenandoah, Pa.—Adjustable propeller for airplanes.

Ralph H. Upson, Brooklyn, N. Y.—Dirigible having a complete metal gas enclosing envelope.

Andrew Mannick, Braddock, Pa.—An airplane engine having two independently operable crankshafts and a propeller shaft connected to each crankshaft.

Adolf Rohrbach, Berlin-Wilmersdorf, Germany—Aircraft fitted with headlamps.

Revolutionary Plane Design

Construction of a vertically rising airplane of revolutionary design is under way at the plant of the Curtis Aeroplane & Motor Company. Successful wind tunnel tests of the machine in model have been made at the company's experimental laboratory, Garden City, Long Island. The machine will cost $75,000. It is the invention of M. B. Bleecker, 24 years old, and embodies the principle of the auto-gyro. Bleecker says the idea came to him while he was a student in the aeronautical department at the University of Michigan.

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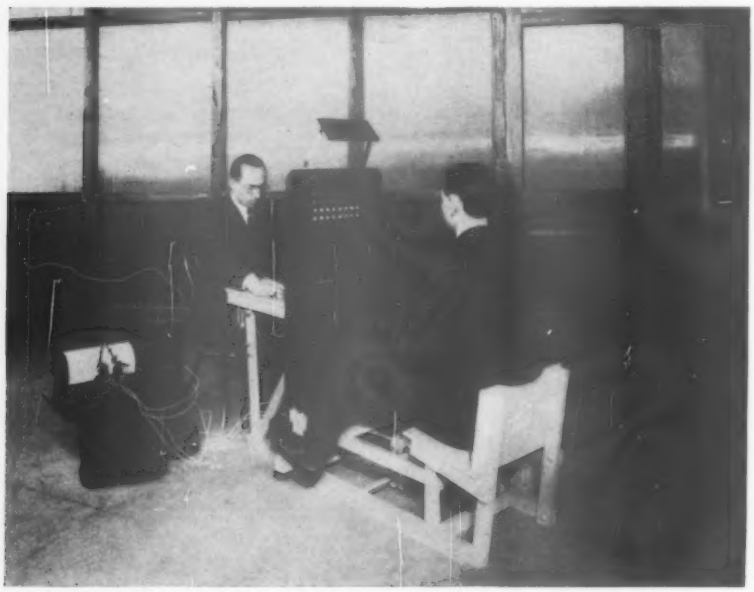
Test Mental Qualities

NOW psychology promotes the science of aviation. The psychology teacher in this instance is a mechanical and electrical genius, unversed in textbooks, but none the less unerring in judgment in determining the mental competence of students in aeronautics. In line with the psychological tests introduced in the postal service for selecting employes, Dr. J. J. O'Rourke of the Civil Service Commission has combined his efforts with the Bureau of Standards and designed a reaction time apparatus for testing aviators. Used in conjunction with the Ruggles Orientator, this machine is now being tested at the School of Aviation Medicine, Brooks Field, Texas, under the direction of Major Francis H. Poole, commandant of the school.



Meanwhile, a brief description of this revolutionary apparatus seems opportune because of the heightened interest in aviation. The machine shown in the left of the photograph is known as the "kymograph" and was constructed in Paris, France, at a cost of $500. It is on the moving drum of this "kymograph" that the fate of the aspiring aviator is mechanically written, this instrument being connected with the test machine itself by intricate wires.

Seated in front of a board on which appears four rows of eight lights each —two rows green, two rows white— the student is instructed to place his feet on the board simulating the rudder of an airplane and hold the improvised joy-stick in his hand. At a small table behind the board, the operator giving the test has a keyboard at his command, and a mirror is placed at an angle over the board to facilitate his seeing the lights.

The student is instructed, before the test, that the operator will cause a green light to shine, and he is required to so move the joy-stick or rudder as to light a white light under the green light which is burning. One row of white lights is governed by the rudder, the other by the joy-stick. Two isolated green lights are placed under these rows of lights, and should the operator light these, the man being tested is instructed to cause all the white lights to burn simultaneously.

A clock in the "kymograph" records the time the light is flashed by the operator and the time the student completes the lighting of the white light. When this apparatus was at the Bureau of Standards it was tested by two competent aviators, who made an excellent record, while two novices to the art of flying proved its worth as a gauge of concentration by making low scores.

While the reaction time apparatus is still in the experimental stages, it is generally conceded by authorities on aviation to be just the instrument needed for mental tests, as a complement to the Ruggles Orientator, which affords almost a purely physical test. In other words, this new testing equipment frankly asks the student of aeronautics, "Are you mentally competent to pilot an airplane, even admitting your physical ability?"

To Adapt Diesel Engine

Harvard University research workers are trying to find out if and how Diesel engines can be made light enough for use in airplanes. More power, greater fuel economy and less fire hazard are three outstanding advantages if this successful type of engine can be adopted to aviation uses, it is claimed.

This cutting down the weight per horsepower of Diesel engines from 250 pounds in motor-driven ships to two pounds for aviation is being investigated by Dr. T. W. F. Brown of Ayr, Scotland, and David H. Alexander of Belfast, Ireland, holders of the two Blair Fellowships at Harvard this year. They are working under the direction of Prof. Lionel S. Marks of the mechanical engineering department of the Harvard Engineering School.

If the results prove practical, the wider cruising radius which such engines would give will put commercial aviation on a quantity transportation basis. The first problem they tackled was to find out exactly what happens in the cylinders of an engine running at 1,000 revolutions per minute during one one-hundredth of a second. Samples are taken of the exhaust gases, temperatures are measured and the size of almost microscopic droplets of the fuel blown into the cylinders is ascertained.

Diesel engines do not use spark plugs, but burn their fuel rather than explode it, using not more than half as much fuel as an automobile engine to get the same power developed. Instead of gasoline they use heavy petroleum from which gasoline and other volatile substances have been extracted. It is due to this low volatility of the residual oil that the possibility of explosions is cut down to a minimum and the safety of the airplane from fire is increased.

The present weight per horsepower of the Diesel engine is the chief thing so far militating against its use for airplane power, and while the Germans have refined this type of engine so that they can use it in trucks, this is only an intermediary step in solving the

problem of lightening the machine. A higher speeded engine is also needed with this type. Prof. Marks estimates that in a distance of 1,000 miles, a 45-pound per horsepower Diesel engine would be as light as a 2-pound per horsepower gasoline engine, weights of fuels for both being considered. Fuel used would cost only one-half to one-third as much as gasoline.

Plane Stability Study

Aeronautical research and experimental work undertaken by the U. S. Bureau of Standards in connection with the promotion of air transportation under the Air Commerce Act, has been directed to two fundamental problems—the development of radio aids to air navigation and the improvement of lighting facilities. This work is so far advanced that during the coming year the Bureau will take up a number of new problems, including an investigation of the stability of planes of different types, an investigation of the strength of airplane joints and fittings of sandard design, and a study of methods of reducing airplane noises. Work will be continued looking toward the perfection of the radiodirective beacon and the field-marker beacons and the further development of telephone communication between airplanes and the ground. A study will be made of the distribution of light from beacons and the light colors that are the most effective.

Brakes Are Recommended

Good brakes are just as essential for an airplane as for an automobile and every plane, whether a commercial or fighting craft, should have a properly designed and efficient set of brakes included as standard equipment, in the opinion of Edgar R. Weaver, Chief of the Testing Laboratory of the Material Division, Army Air Corps, Wright Field, Dayton, Ohio.

Many airplane accidents occur while on the ground, either in landing or during the take-off, the cause of which is a direct result of poor controllability, according to Mr. Weaver, and the added brake equipment would prevent many collisions with fences, buildings, trees, other airplanes and eliminate ground looping.

"The time is here," Mr. Weaver declares, "when the flying public is demanding brakes just as they do when they purchase an automobile. There should be no doubt in the minds of everyone that adequate brakes are the next step toward the promotion of safety in flight. For many years it was generally conceded that an airplane could not be equipped with brakes on account of the danger of nosing over, but this difficulty is entirely overcome in the general design of the modern airplane by mounting the landing gear far enough ahead of the center of gravity location."

Experimentation by the Material Division of the Army Air Corps with different kinds and types of brakes has demonstrated that the most suitable brake for an airplane is the internal expanding, self-energized mechanical type, which is lighter in weight than the hydraulic type, and can be built into the wheels and operated by a small cable connected to the tilting type rudder pedals which makes it possible to apply the brakes either simultaneously or separately and control the rudder at the same time.

E N L I S T !

IN

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NO FURTHER OBLIGATIONS OF ANY NATURE. All training, uniforms, or drills, are entirely optional. They may be taken, or not, during the term of enlistment.

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The Washington Conference

RECOGNIZING that the continued growth of commercial aviation rests entirely upon its safety, representatives of the industry meeting in Washington during December recommended the adoption of measures for safe transportation of the public by air.

Approximately 300 aircraft manufacturers and operators, engineers and others affiliated with the industry were present at the conference which convened at the invitation of William P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics. Under the Air Commerce Act passed by Congress last year the Department of Commerce is charged with the promotion and supervision of civil flying. For the past year commercial operations in the air have been carried on under regulations established by the Department.

In the exercise of its regulatory authority the Department's policy, as established by Secretary of Commerce Hoover, is to cooperate with the industry in the promotion of its welfare. The purpose of the conference was to consider the adoption of more comprehensive regulations which either were regarded as desirable by the Government or had come from the industry itself.

Probably the most significant step taken by the conference was its recommendation that the industry and the Department of Commerce should adopt a code governing airplane design and construction setting forth the specifications and requirements for a structurally airworthy plane. This code will be issued as a hand book for the industry and its provisions will be come effective July 1, 1928.

Of immediate interest to the flying public was the decision of the conference that war surplus planes shall be used in the future only so long as they remain airworthy. The use of the wartime "Jennies" and Standard planes is still a vital factor in commercial aviation as they represent a considerable proportion of the planes in service. The Commerce Department tentatively had proposed that the war planes no longer should be licensed to carry passengers. Both manufacturers and operators of airplanes held that such a restriction was unnecessary, as condition and not age determine whether a plane is airworthy and that regular inspection of planes is the proper safeguard.

The classification of flying schools will be undertaken by the Department of Commerce as a result of consideration given to this proposal of Government supervision over schools but it was generally agreed that the classification of schools should depend upon the courses of instruction offered and the equipment used.

The rating of airports by the Department of Commerce according to their location, size and facilities for air navigation both day and night was brought before the conference with the result that the Commerce Department may postpone activity in this direction, except for preliminary work to determine the practicability of the scheme. The examination and rating of air navigation facilities is a requirement of the Air Commerce Act.

A proposal for introducing a new system of licensing pilots which contemplates a larger number of grades based not only on the experience and efficiency of the pilot but on the type of plane handled was opposed by the conference. The conference also recommended that a proposed rule that licensed planes should be operated, except in emergency, only from licensed fields in fixed base operations, when the Department establishes its field licensing system should be held in abeyance.

An address by Col. Charles A. Lindbergh and a message from President Coolidge featured the closing session of the conference. The President suggested that an international civil aviation conference and exhibition should be held in Washington next December on the twenty-fifth anniversary of Orville Wright's first flight. Col. Lindbergh declared to the conference that "it is now time for a step forward by inaugurating regulations which will assure the traveling public of as great safety in every form of air activity as they have at present in our organized air lines. The greatest mission that can be accomplished by the Department of Commerce," he said, "is that of guaranteeing safety in air travel to the public through intelligent regulation and guidance of training schools, operating personnel and commercial aircraft construction."

German Proposal Rejected

The United States Government is disinclined to countenance establishment in the Panama Canal Zone, or anywhere in the Republic of Panama, of a commercial air base, controlled by any foreign power.

Although no official expression to this effect has yet been made, prevailing sentiment in all official circles in Washington is directed unequivocally against an application made by the Scadta, a German aviation company, for a base in the Canal Zone. At the State Department it was said that the application made by Dr. P. P. von Bauer, on behalf of the Scadta, had been referred to a special committee consisting of representatives of the Departments of State, War, Navy, Post Office and Treasury, and that the right to consider the application had been reserved until this committee had gone over the matter. It is quite apparent, however, that this application will not be granted.

The Scadta Company now operates an air line from the Colombian coast, up the Magdalena River, to Bogota, and desires to extend its route from Colombia to Panama.

Most conclusive evidence that the application will be rejected is contained in the Treaty of 1903 between the United States and Panama, which imbues this country with sufficient power, according to officials, to reject the German, or any other foreign application, for permission to establish an air base in the Zone proper. It is held, moreover, this treaty grants the United States powers even to reject the application for establishment of a base in Panaman territory not a part of the Canal Zone.

An excerpt from the 1903 treaty reads as follows:

"The Republic of Panama further grants to the United States in perpetuity, the use, occupation and control of any other lands and waters outside of the zone about described, which may be necessary and convenient for the construction, maintenance, operation, sanitation, and protection of the said Canal."

The new treaty with Panama, which was rejected recently by the Panaman National Assembly, includes the following provision:

"Aircraft owned and operated by the Nationals of the United States or Panama may operate in the Republic of Panama, provided both the aircraft assume considerable economic importance. Therefore all motors controlled

and the operators thereof hold a joint United States-Panama license issued by a board composed of representatives of the Governments of the United States and Panama and otherwise to conform to restrictions recommended in the Convention for the Regulation of Aerial Navigation signed at Paris Oct. 13, 1919, or such other restrictions as the two countries may from time to time jointly prescribe."

"Robins" by Spring

Plans for the production of a new commercial plane to be known as the "Robin," on an even larger scale than was originally announced, were revealed lately by C. M. Keys, president of the Curtiss Aeroplane and Motor Company.

According to Mr. Keys, this decision was made after C. S. (Casey) Jones and Major William B. Robertson had completed a study of the commercial market. These planes will be built at the new plant of the Curtiss-Robertson Aircraft Corporation in St. Louis and will be powered with the well-known Curtiss OX commercial motors.

This announcement reveals, for the first time, the fact that the Curtiss Company interests have on hand a large number of these standard commercial motors, the supply of which was supposed to be exhausted except for a few that were held by small groups in different parts of the country. These motors were built in 1918 by the Curtiss Company and the Willys-Overland Company at Elmira, N. Y., and were the training motors of the U. S. Army and Naval Air Services. British training schools used more than 3,000 of them in preparing pilots for active service during the World War.

In 1920 the Government and the Curtiss Company placed a large supply of these motors on public sale and as a result nearly all the well-known commercial aircraft companies who are building small planes for private use, have equipped their products with these motors.

The Curtiss Company repurchased 4,800 of these motors from the Army in 1919 and has sold them to manufacturers and individuals at prices ranging from $200 to $800 each.

Commenting on the situation in regard to these motors, Mr. Keys said, "The control of the last thousand of these old reliable powerplants seems to

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AVIATION enthusiasts everywhere have expressed admiration for this beautiful miniature of the monoplane that established world's records, and will live in history until the end of time. It is a fitting memento of the epoch-making flight of the intrepid "Lone Eagle."

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HERE the "Spirit of the Times" is shown as book ends. Highly artistic in design and workmanship, graceful and realistic in pose and accurate in proportion. Here the monoplane is depicted, in high relief, emerging from a bank of clouds. The sculptor has caught the utter lonesomeness of the trans-oceanic flight and the ruthlessness of the surging sea. The tilt of the plane gives a suggestion of speed and the freedom of a bird on the wing. It would be difficult to imagine a more appropriate holiday or birthday gift for any person. 5" high, 5" wide, and 3½" deep. Finished in Government Bronze, Oxidized Silver, or Antique Brass. Weight 4½ lbs.

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assume considerable economic importance therefore all motors controlled by the Curtiss Company have now been definitely withdrawn from public sale and have been sold to the Curtiss-Robertson Company for use in the 'Robin' airplane. The St. Louis group, which includes Harry H. Knight, Harold M. Bixby, Major A. B. Lambert, and Major William B. Robertson, the original backers of Colonel Lindbergh's flight to Paris, has expanded and capitalists from Chicago, Cincinnati, Louisville, and New York are now affiliated with this enterprise. Present plans call for additional commercial models to follow the production of the 'Robin' as the demand arises."

Increasing Safety of Flight

MEANS for increasing the safety of air travel, a problem which is now receiving close attention both in this country and abroad, are discussed in a report just issued by the National Advisory Committee for Aeronautics. The report is a translation from the French of a paper presented before the Societe Francaise de Navigation Arienne, by H. Brunat, of the Service de la Navigation Arienne. Mr. Brunat is one of the foremost French aeronautical engineers.

Mr. Brunat has analyzed the problems arising from airplane accidents and his suggestions for improving present practice in plane design and construction are intensely interesting. Except for certain types, he says, airplanes lack inherent stability. This comment is significant in view of the fact that the U. S. Bureau of Standards now is investigating the stability of planes of different types. Mr. Brunat sums up the limitations of existing airplanes:

"The speed range is too small, the efficiency of the tail group insufficient in stalled flight and the position of the ailerons dangerous when their action is exerted at the minimum critical speed."

Some designers and technicians have devoted their efforts to the problem of stability but, according to Mr. Brunat, the importance of this question is denied by other constructors, who consider that its solution would necessarily be detrimental to other qualities of the airplane. Although this may be true, he remarks, inherent stability is such an important factor of safety that it must be developed even if performance is reduced, a result, however, which has never been demonstrated.

Mr. Brunat recommends that an investigation should be made of the action of the control surfaces and ailerons at the critical speed for sustaining the plane in the air. It is evident, he asserts, that if, by some device the rudders could be made effective at the critical speed, means would at last be provided for correcting the instabilty which precedes stalling, thus avoiding a spin and reestablishing the stability of the airplane more quickly. General adoption of the differential aileron control, already invented, is urged by Mr. Brunat. By operating this control, one aileron can be sharply raised, while the other is only slightly lowered, thus straightening the plane laterally and bringing it into a gentle glide.

An enormous increase in safety would be obtained by reducing the take-off and landing speed to 25 or 30 miles an hour, but Mr. Brunat asserts that this advantage should not be offset by an excessive reduction of the cruising speed, as the airplane would then be of no practical use. As the discovery of a device that would accomplish this object may still be in the distant future, Mr. Brunat advises that it would be unwise to wait upon it for a solution of the present need. The Handley Page sloted wing gives satisfactory results. It is like a speed gear applied to the airplane. By means of this wing the pilot is able to increase the lift or drag at his convenience. Mr. Brunat expresses the belief that further research ought to be based on this idea and directed first toward devices designed to create a zone of negative pressure on the upper surface if the wing is to support the airplane at cruising speed.

Safety in flight largely depends on the proper functioning of the engine. Next to fog, engine trouble is what pilots fear most, as it may force a landing when no suitable landing place is in sight. The parts most frequently subject to failure are valves and controls, springs, valve rockers, and valve-rocker pins. Next come failures due to piston troubles and Mr. Brunat comments in this connection that the new types of engines represent real improvments. Most breakdowns are diagnosed by Mr. Brunat as due to lack of inspection and care of the engines and this suggests to him the importance of close cooperation of the airplane and engine manufacturers with the aviator.

To obtain this cooperation he recommends adoption of a "rent-and-sale" system, under which the user would rent the air-plane for a certain period, after which he agrees to buy it if the terms of the contract are fulfilled. The airplane and engine builders thus would be kept more closely in touch with their products and would be enabled to design new airplane and engine types.

Mr. Brunat asserts with reference to engine improvements that the number of failures to which they are subject could be reduced by the elimination of valves and water cooling. He recommends that sample engines should be subjected to longer endurance tests on the ground that this is the safest and most practical way to detect defects and determine the value of experimental improvements.

The introduction into use on air transportation lines of multi-engined airplanes, able to fly with one engine stopped, leads Mr. Brunat to hope for the practical elimination of forced landings, provided the engines are made easily accessible during flight, thus enabling the mechanic to make the necessary repairs. To reduce the number of accidents due to fire, Mr. Brunat recommends that either the fuel tank should be placed directly behind the engine or that it should be adequately protected, and to reduce the seriousness of accidents, whatever the cause, he advocates placing the baggage room in the front end of the fuselage of passenger planes and the cabin farther aft.

Seeding by Plane

"Hiram, take the plane and sow wheat on that northeast forty this morning, and while you're at it you might as well sow the grass seed in the pasture. Then come in to dinner."

That is something like the language the hired man on the farm will soon be hearing, judging from reports of progress along this line.

Aviators Perkins and Adams took a contract to seed 1,200 acres of land in the Coquille Valley, near Roseburg, Ore., by airplane. The tract is logged-off land, owned by the Coquille Valley Sheep & Wool Company. The work required five tons of seed. The aviators constructed a special seed hopper to be used in scattering the seed.

Questions and Answers

Q.—Please tell me the closest pursuit school to Chicago and the entrance requirements. R. P. B., Chicago.

A.—Selfridge Field, Mt. Clemens, Mich., but army aviation cadets do not receive preliminary training at the pursuit schools. A complete list of the requirements for entrance into the army aviation training schools was published in the November issue of POPULAR AVIATION.

Q.—What are the chances of a good student of mathematics, algebra, geometry and trigonometry and a knowledge of the principles of drafting in aviation. E. W.

A.—Just what they would be in any other industry involving the use of mathematical and engineering formulae. You ought to know that many young men are anxious to obtain positions in aviation and consequently the available positions are few in number compared with the number of applicants. This means that the firms looking for men can select those with the best experience.

Q.—Is there a flying club in Chicago? What is the best way to get a club started? Must I have fifty hours before I can get a license? L. M. B., St. Louis, Mo.

A.—If you will write us giving your local address we will forward you the desired information about starting a club. Fifty hours is the requirement for an industrial license.

Q.—I would like to be referred to the nearest government hospital to New York City. Also, how can I get in touch with some of my "air devil" friends of the 39th Aero Squadron. Al Coleman.

A.—Communicate with the American Legion Monthly, and also, with the nearest aviation post of the Legion.

Q.—Can you refer me to someone at Curtiss or Mitchel Field so I can obtain a job as mechanic or helper or anything? J. T., New Jersey.

A.—We cannot refer you to any company or individual. We suppose that you are aware that the demand is for licensed mechanics. If you want such a place go after it and try to get it on your own merits.

Q.—What is the best school outside the Army or Navy? M. W., N. Y. (and about 20 others).

A.—We cannot be expected to grade schools in point of efficiency, especially since no one agrees on a basis for such a grading. We can tell you, however that POPULAR AVIATION does not accept advertisements from any schools that are not equipped to actually teach their students. So you are perfectly safe in writing any of our advertisers.

Q.—How old must you be to enter the Army or Navy schools for aviation. J. J. D., New York (and several others).

A.—The age limit for instruction in the Navy is 28 years, and the Army requirements are from 20 to 27 years.

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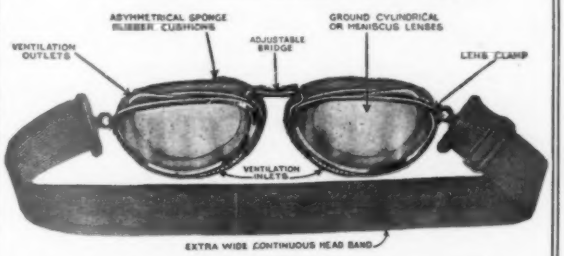

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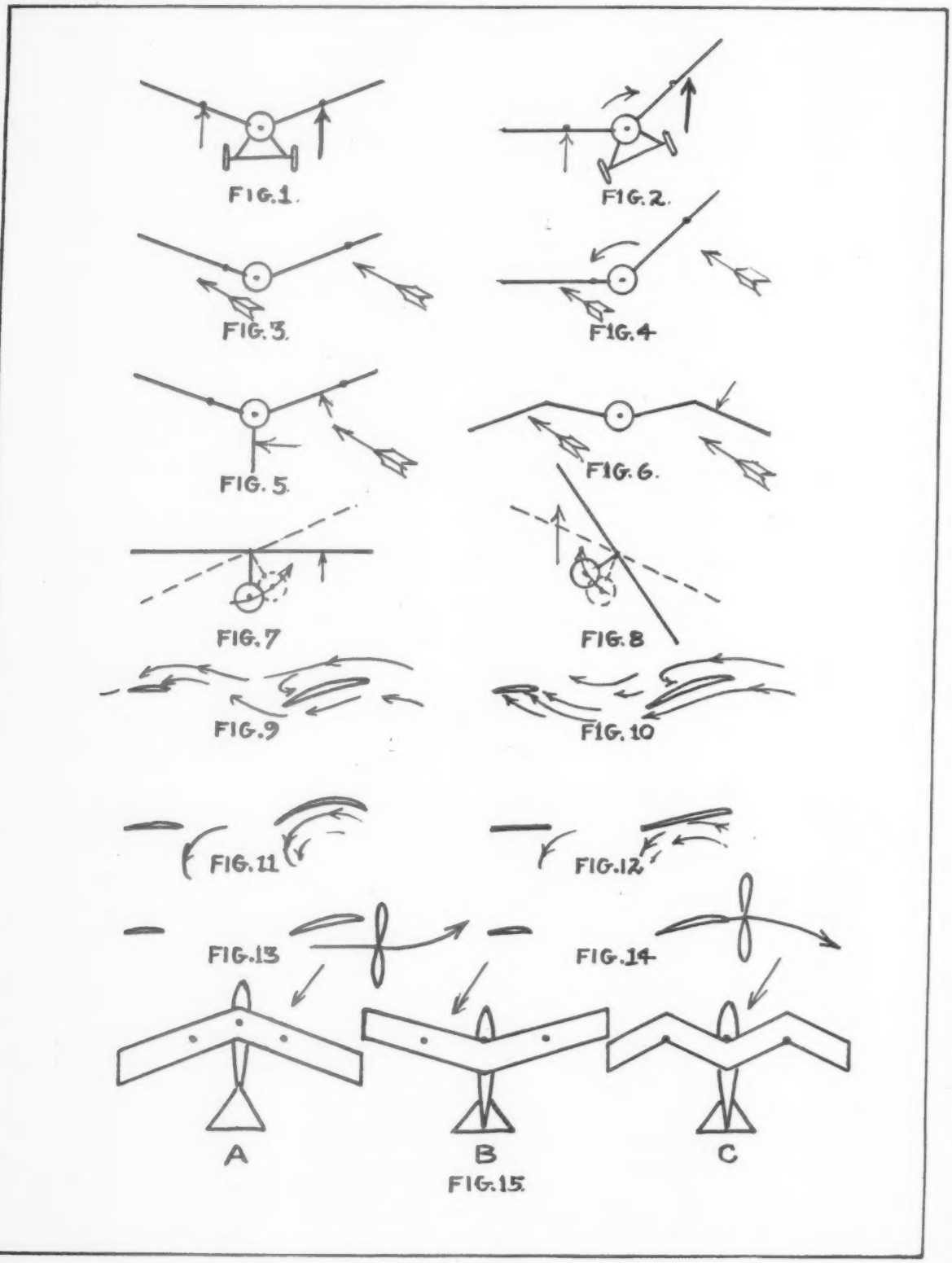

Tabloid Aviation

By L. J. Lesh

FIVE THOUSAND feet above the desert a very lazy buzzard rises in an ascending spiral on motionless wings. He never heard of Langley's theory of "the internal work of the wind," Otto Lilienthal's coefficient "K," Zahm's formula for skin friction and the fact that .0005 V^2 equals wind pressure per square foot means nothing in his young life, but—oh boy, how he can fly.

The buzzard, equally at home in a zephyr or a hurricane is cited as an introduction to this little treatise on tabloid aerodynamics in order to reassure the reader that the discourse will be nontechnical and not involve mathematics. It can and should be understood by every knight of the joy stick.

Referring to the rather compact page of simple diagrams, figures 1 and 2 show why an airplane with upturned wings commonly referred to as a dihedral angle restores its balance automatically when one wing is struck by a puff of wind from the front. After the puff passes the lowered wing is at a more favorable angle for lift and back comes the machine to an even keel.

Figures 3 and 4 show why the upturned wings are not so good when struck by a side gust. The wing nearest the direction of the wind gets a lot of lift and the other surface gives no support at all. The airplane tilts away from the wind and sideslips until pressure is developed against the lower wing due to this side motion. The action is corrective, taking place after the disturbance and is inferior to the action introduced in the wings of figures 5 and 6 which is preventive, taking place at the instant the side gust strikes the machine.

Figure 5 introduces the fin keel or vertical surface located below the center of the airplane which balances the tipping effect of a side gust on the wing. The "keel" effect may be scientifically incorporated in the design of the airplane which is seldom the case or may be an accidental advantage obtained by fuselage, pontoon and other surfaces below the center of gravity.

Figure 6 shows a wing attitude well know to the sea gull but difficult to achieve in a practical airplane. This attitude of wing gives inherent stability due to the greater leverage obtained by the far wing when the machine is struck by a side gust.

Figures 7 and 8 reveal why a low center of weight machine such as the common parasol monoplane is "not so hot." A wind gust raising one wing starts the weight oscillating in pendulum fashion and if another gust strikes the other wing at the proper time during the swing the precarious tipping angle shown in figure 8, full line, is the result. A low weight, or low center of gravity airplane may kid

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Dandy unused model 40 Aeromarine flying boat with Curtiss OXX6, 100 H.P. motor, radiator and propeller $2470, or less motor, radiator and propeller $1800.

Slightly used 130 H.P. Clerget 9 cyl. rotary motor $150. New 220 H.P. Hispano motor $450. New 100 H.P. Gnome motor F.O.B. Florida $75.00.

Black leather breeches with laced bottoms $12.00. Black leather wool lined coat 36"—reversible—$18.00. Black leather sheeplined coat, 36", fur collar $23.50. Leather jacket (no collar) dark wool lined $12.50. Mechanics suit, herringbone cloth, button fastened, white or khaki $4.75. Mechanics suit, herringbone cloth with hookless fasteners down front, white or dark khaki $6.50. Flying suit, herringbone cloth with hookless fasteners in front, wrists, crotch and ankles having two large diagonal breast pockets and one pocket on each leg above knee, dark khaki or white, dandies, $9.00. Leather gauntlets, black horsehide, fully lamb lined, full mitt, wrist strap $5.00.

Face masks, leather, wool lined covering entire face and chin with opening for eyes and mouth $2.00. Face mask only, knitted, cloth type 75 cents. Gold wings with vertical propeller for wearing on coat lapel $1.00. Sheeplined moccasins $5.50.

Winter flying suit, wool lined with hookless fasteners $29.50, or sheeplined with hookless fasteners $39.50, or specially high grade and specially heavy sheeplined with hookless fasteners $60.00. Dandy fur lined leather helmets $10.00, or beaverized sheeplined leather helmets $7.00, or chamois lined $5.50, or corduroy lined $3.75.

Curved lenses, wide-vision protector goggles $6.50, or Italian gogglette with wide-vision, curved lenses $3.75, or No. 8145 wide-vision, curved lenses gogglette $5.00. Wide-vision goggles with face mask for cold weather $3.50.

The following are non-shatterable, wide-vision goggles: NAK, chenille padded $4.00. DG extra heavy chenille $4.50. RAV, rubber bound $4.50. Jumbo oval, moderate size chenille padded $2.50.

¼" shock absorber cord 50 cents yd. ⅝" shock absorber cord 75 cents yd.

All parts for Curtiss JN4D, Canuck, Standard, OX5, OXX6 and many Liberty, Lawrence, Clerget, LeRhone, Fiat and Hispano parts. 2-cyl. 28 H.P. Lawrence motor $125.00; propeller therefor $20.00. Everything for aircraft. Send for Aviation Catalog.

Logan Airplane Motors Co.

716 W. Superior
Cleveland, Ohio

Tabloid Aviation

(*Continued from page 67*)

itself along for months but the day will finally come when a succession of unfortunately timed side gusts will synchronize with its natural period of oscillation and it will act just like the good old swing suspended from the branch of the apple tree back on the farm.

Figures 7 and 8 present a side view of the main wing and tail of an airplane and show how a change in speed effecting the wind stream may convert the elevator from a lifting to a depressing effect without the aviator touching his controls. This effect is worth watching when an airplane goes into a vertical dive since it may happen that the full restoring position of the elevator coincides with the direction of the air wave at high speeds and has little or no effect in control.

Figures 11 and 12 portray an effect observed and described by the Wright brothers during their experiments at Kitty Hawk. On several occasions, while flying close to the ground their gliders suddenly lost all support and made a violent landing. The Wrights discovered that the wind was rolling up the hill in rotary gusts which at times exactly coincided with the curve of their wings and reduced their lift to zero. Under these circumstances a flat wing such as shown in figure 12 would give more lift that a curved surface.

Figures 13 and 14 show the effect of a high and a low center of propeller thrust with respect to the center of resistance of the airplane. The low center of thrust seen in figure 13 would tend automatically to bring the airplane out of a dive when the motor is accelerated while the high thrust of Figure 14 would do just the opposite. Hugh Robinson once brought the writer safely down to the surface of Lake Keuka in an old Curtiss biplane with the elevator control "frozen" by the the simple method of throttling the engine at the proper time and eliminating its high thrust effect.

A, B and C of figure 15 show three plans of wing and their centers of pressure and resistance with respect to the center of gravity respectively. The center of resistance of "A" is behind the center of the machine and tends automatically to head the machine into the wind, aiding the arrow action of the tail surfaces. "B" and "C" are more or less neutral in this respect but "C" when combined with the form of wing shown in figure 6 has some rather complicated but distinct advantages in the way of automatic stability. All three of these attitudes are assumed by soaring and sailing birds, depending on how fast they want to fly and whether they desire automatic stability or sensitive mobility in the air. "B" is the usual attitude of the great soaring birds in circling flight and is worthy of much study but a rather dangerous model for a man carrying glider or a motor driven airplane.

Club News

(*Continued from page 46*)

Baltimore, Md.

The Baltimore Aero Club has been formed at Baltimore, Maryland, with W. F. Peck, 4023 Boarman Ave., president, and Warner S. Hull, 919 Harlem Ave., vice-president.

Montreal, Canada

The first aeroplane club to be incorporated in Canada is the Montreal Light Aeroplane Club. It has started with an initial list of 90 flying members. Flyers in Montreal have been working for many years toward the organization of such a club.

In 1919 former R. N. A. S. and R. F. C. pilots got together in an organization but owing to lack of funds nothing was accomplished. Last summer, after much hard work, aviation enthusiasts secured the co-operation of the Dominion government which offered two DeHaviland Moths to any club with 10 ex-pilots who would provide a landing field and guarantee the proper upkeep of the machines. Furthermore the government offered to present the club with a machine for each machine purchased by the club.

The Montreal Light Aeroplane Club has been offered the use of the new St. Hubert airport and will erect a club house and hangars there. The entrance fee is $25.00 and yearly dues are $25.00. Flying time will be charged at the rate of $5.00 an hour, which is estimated to cover only the actual cost Ground courses are being organized for the winter months and are held in a lecture hall loaned by McGill University.

In May the club plans to start active flying. One of the interesting features of the club scheme fostered by the Cana-

dian government is the fact that the government pays into the club treasury the sum of $100.00 for every pilot from the club who takes out his certificates.

The St. Hubert airport which will be used by the club is the site of the mooring mast for dirigibles erected when the port was chosen as the terminus for the England-Canada dirigible line which will be placed in operation late in the summer. It is also the terminus of the Montreal-Rimouski service now in operation. This mail service cuts 36 hours from the trans-Atlantic mail time. Mail is picked up from the steamers at Rimouski, in the gulf of St. Lawrence and flown to Montreal. St. Hubert is located on the south shore of the St. Lawrence about 4 miles from Montreal. It is in the shape of a triangle, with the smallest side more than a mile in length. The countryside is flat and free from obstructions and the ground is level and well drained.

The address of the Montreal Light Aeroplane Club is P. O. Box 1462, Montreal, Canada. W. S. Lighthall is president of the club.

Chicago-Dallas Night Service

ANOTHER step in bringing the boundaries of our country closer together has been completed in the establishment of a night air mail and express service between Chicago and Dallas, Texas, by National Air Transport, Inc.

The thousand miles of airway from Chicago to Dallas have been lighted with 1,000-watt revolving beacons, each of approximately 2,000,000 candlepower, placed at intervals of about one every ten miles, with acetylene flashers every three miles. This is the second airway to be lighted for night flying of mail and express, the first having been the trans-continental line, which was lighted under the administration of Col. Paul Henderson as Second Assistant Postmaster General in 1924.

While the day flights to the Southwest have saved time, in most cases a great deal of advantage could not be obtained. With the inauguration of night flights, the whole Southwest has been brought a full day closer to Chicago and in many cities overnight service will be obtained.

This, of course, will also benefit other cities in the Middle West almost as much as Chicago. For instance, a letter mailed in Minneapolis, Milwaukee, Detroit, Cleveland or Indianapolis in the afternoon will be delivered in Texas cities the next morning after mailing.

While the regular air mail service from Eastern cities will not be affected by this change of flights, it will be possible to get morning business on the day flight out of Hadley Field, New Brunswick, N. J., which leaves at 12:15 noon, and have that mail delivered in Texas the next morning. This will save a full day over the regular air mail if the sender has time to get it on the day flight from the East.

It is possible that points in the Pacific Northwest will also find it to their advantage to use the air mail via trans-continental to Chicago and over the new night flight to Texas.

With the night flight from Chicago to Dallas taking effect, Texas Air Transport will start operation of its lines between Dallas and Galveston by way of Houston and between Dallas and Laredo by way of Waco, Austin and San Antonio.

The establishment of the Dallas-Laredo line opens the way into Mexico. It is understood that Mexican air mail service is just about ready for operation, so that with Mexican and American air mail lines meeting at Laredo, Texas, airmail, express and passenger transportation between New York, Chicago and Mexico City, over one of the longest air lines in the world will be possible at a comparatively early date.

The great Southwest does the bulk of its long distance business with Chicago and the North Central states and cities, rather than with the seaboard. The Chicago cotton exchange, waterways, and geographical and railroad facilities have brought about the financial connections between the Southwest and the Lakes region. Millions of dollars are involved in the commercial relations existing between these two sections. Heretofore some of the advantage of airmail speed was lost in the Southwest due to the day service—the mail and express accumulated during business hours having been held over night until the plane left in the morning. With the new service no holdover will occur.

B - 1

***of* 50**

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Airport Steps Out for Business

THE Chamber of Commerce of Visalia, Cal., has not only undertaken to develop an airport but has started on a unique campaign to secure business for the airport. Visalia is practically half way on an airline between San Francisco and Los Angeles and so is strategically located for business.

The airport is in operation with day and night shop, fuel, telephone, restaurant and taxi service, and night flying equipment has been ordered.

The Chamber of Commerce has mailed to a large list of aviators an identification card which is unique in that it offers the visitor a number of special courtesies that are bound to bring business. The presentation of the card is all the fare needed for transportation to and from the field. The holder can "nod" his way into the Visalia theatres, the swimming pool and the dances. If he wants to he can have the privileges of the Visalia Golf Club. And finally he can secure special rates at one of the hotels.

Undoubtedly the plan required some "selling" on the part of the local Chamber in conection with the privileges granted by business houses, but there is little question that holders of the cards will drop in at Visalia to look the hospitable city over. A. A. Clark is director of the Aeronautical Division of the Chamber of Commerce.

Woman Heads School

Many women have been attracted to aviation but there are few executives in the industry among the fair sex. Miss Olive B. Williams is one of them, as she heads the Aviation-Automotive Engineering School at Long Island City, New York. Miss Williams has gathered a staff of men well trained for school purposes, consisting of James V. Fone, Directing Engineer; Lt. Erwin K. McWilliams, Pilot-Demonstrator, and Charles D. Cords, who is president of a local aircraft distributing corporation.

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Information Wanted

The Shawnee Air Transport, Shawnee, Okla., is seeking information concerning their pilot, Pat Murphy, who left their port without permission in a Waco 10, ship No. 796, motor No. 4929. They will appreciate any information that can be given as to his whereabouts or that of the ship.

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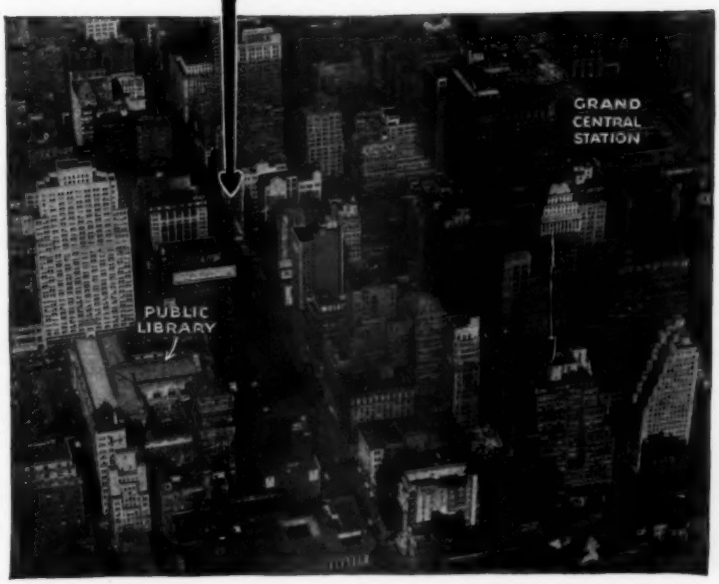

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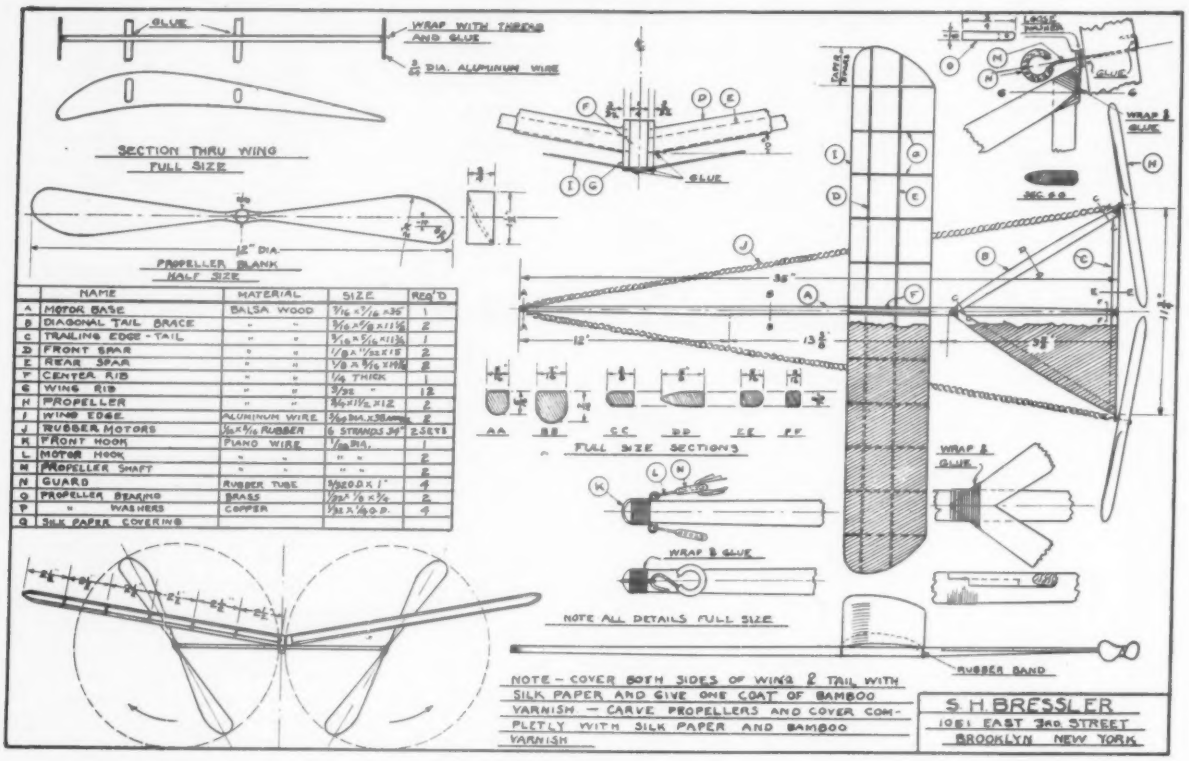
(Continued from page 41)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	NAME	MATERIAL	SIZE	REQ'D
A	MOTOR BASE	BALSA WOOD	7/16 × 7/16 × 36"	1
B	DIAGONAL TAIL BRACE	" "	3/16 × 7/8 × 11 1/2	2
C	TRAILING EDGE - TAIL	" "	3/16 × 3/16 × 11 1/2	1
D	FRONT SPAR	" "	1/8 × 1/2 × 18	2
E	REAR SPAR	" "	1/8 × 3/16 × 18	2
F	CENTER RIB	" "	1/4 THICK	1
G	WING RIB	" "	3/32 "	12
H	PROPELLER	" "	3/8 × 11 1/2 × 12	2
I	WING EDGE	ALUMINUM WIRE	3/32 DIA. × 38"	2
J	RUBBER MOTORS	1/16 × 3/16 RUBBER	6 STRANDS 34"	2 SETS
K	FRONT HOOK	PIANO WIRE	1/16 DIA.	1
L	MOTOR HOOK	" "	" "	2
M	PROPELLER SHAFT	" "	" "	2
N	GUARD	RUBBER TUBE	5/32 O.D. × 1"	4
O	PROPELLER BEARING	BRASS	1/32 × 1/8 × 1/2	2
P	" WASHERS	COPPER	1/32 × 1/4 O.D.	4
Q	SILK PAPER COVERING			

parts are actual size on the drawing. One hundred and seventeen seconds is possible with this model.

There you have it. You can obtain most any of the back numbers, postpaid, by sending 25 cents (each) in money order to POPULAR AVIATION, specifying clearly which issues you desire.

Please note the following corrections:

Page 42, November issue. The drawing was reduced in size for printing so references to "the size shown in the drawing" must not be used, as the drawing as printed is smaller.

Page 48, January issue. The following should be noted on your "records list": 1922 tractor rise of water duration, 1 minute 58 seconds. B. Likosiak should be 1 minute 56 seconds. L. Hittle. Indoor hand launched duration, 2 minutes 53 seconds, by Jack Loughner, for less than 15-inch motor.

The scale model time has also been changed to 22 seconds R. O. G. by J. Rappold of Chicago at Memphis. Mr. Jaros in 1921 made an official time of 22.4 seconds R. O. G. with his S. E. 5 Scout, using a geared drive from the rubber to the propeller.

Durable Racing Model

THIS model was designed with the sole purpose of eliminating the difficulties experienced by the amateur model builder. Most record breaking models are frail and difficult to construct and handle. The type of model to be described will stand a considerable amount of rough usage and severe shocks in landing without doing any damage and yet have a very good duration as well as distance record, having flown for a duration of one and a half minutes to three and one-half with a distance of over a mile. It can be flown in any wind which is impossible with some of the light and frail racing types of no better performance.

The drawing shows the complete construction and dimensions for building this plane.

Motor Base.—The motor base (A) is a piece of Balsa wood 7/16 in. square, shaped and tapered off on both ends as shown in sections AA, BB and FF. The best method to shape this is with a piece of sandpaper on a block of wood. As can be seen in the drawing the tail surface acts also as a means of support for propellors and bearings. This tail frame is also made of Balsa wood and the members B and C are shaped to the sections as shown in CC, DD and EE. The joints should be wrapped with fine thread and glued all over with ambroid. The method of joining is shown in the details.

Wing.—The wing consists of thirteen ribs of the shape shown in the full size section. Twelve being 3/32 in. thick and one center rib being 1/4 in. The wing should be assembled in two sections. When the sections are finished they are glued together with the quarter inch rib between them. This gives a good support for the wing on the frame. The spars should be rounded off on both edges to fit the slots in the ribs and are tapered off on both ends as shown. One end of each spar is cut to an angle of ten degrees. This forms the dihedral. The spars are now carefully slipped into the ribs and properly spaced. As can be seen the first rib is lined up to be flush with the spar at the point where the

ten degree angle has been cut. It is now ready for gluing by putting a fillet of glue on each side of the ribs. Before the glue is allowed to dry, the wing should be placed on a flat board. A board of sufficient weight should be laid across the ribs to keep them all down. This will insure the wing remaining straight when the glue dries. Entering and trailing edges are of 3/64 in. diameter aluminum wire and are fastened to the ribs with fine thread and glued as shown with Ambroid. When the two sections are completed they are glued together with the center rib. The wing is now ready for covering. It is covered with silk tissue on both sides and given one coat of bamboo varnish. When the bamboo varnish is dried enough so that it will not stick to anything, the wing should be placed on two flat boards which are inclined to the proper dihedral angle and sufficient weights should be put on top of the wing until it is perfectly dry. This will assure a perfectly true wing. It is also a good plan to keep the wing there when not in use to prevent distortion. The tail also should be covered on both sides and given one coat of bamboo varnish.

Propellers. — The propellers are twelve inches in diameter and should be laid out as shown. They should be carved from left to right. To prevent them from breaking in landing it is best to cover them all over with silk tissue and give them three coats of varnish.

Adjusting and Flying.—When the model is completed, the wing should be held in place by a strong rubber band which is looped around the motor base, slipping the wing through and placed approximately in the position shown in the drawing. It is now ready for winding the rubber motors with a winder made from an egg beater. The rubber should be lubricated with soft soap and water. This assures a greater number of turns as well as a protection for the rubber. About six hundred turns should be given for the first trial. The model is now gently launched into the air with the wind. Should the model tend to climb too rapidly, the wing should be moved back or vice versa, until it flies at a perfectly even level. When adjusted properly the wing should be marked on the motor frame. The rubber motors can be wound up for a full flight about one thousand turns.

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Model Airplane Meet

On Saturday, Nov. 26, a model airplane tournament was held at the "Valley Mid-Winter Fair," in Harlingen, Texas. Prizes offered by the Valley Fair Association, and by the Harlingen Star, were won by Leonard H. Irving for the best model of modern commercial airplane, to Dalton Van Dresar, for the general contest, and to Marion Rose, for speed and distance. High winds brought several of the contestants to grief when their planes "cracked up" in the preliminaries.

The contest was sponsored by the "Valley Airways, Inc.," which has been in operation for less than four months. The corporation has its headquarters at Harlingen, with a hangar on the "Arroyo Flying Field," and is engaged in passenger carrying and instruction. The company has the agency for the "Waco" in the Lower Rio Grande Valley.

Railroads Study Air Traffic

The development of commercial aviation is being closely watched by the railroads and the airplane in its relation to the handling of passenger and freight traffic was a feature of the annual meeting of the American Short Line Railroad Association in Washington recently.

Referring to the right given by the railroads to the American Railway Express Company to handle express by plane, Bird M. Robinson, President of the Association, stated in addressing the meeting that "the action of the railroads in this respect is a progressive one and should be appreciated by the public."

He also said that the arrangement with the express company was made "with a view to ascertaining what results can be accomplished." "It is predicted," he said, "that within a few months, certainly within a year or two, that aviation will reach all parts of our country, and that they will handle a large volume of traffic, consisting of passengers and commerce."

Book Reviews

The Model Maker; Spon & Chamberlain, 120 Liberty St., New York: Model airplane builders will be interested in this bound volume No. 4, of the interesting little magazine published in the interest of model building of every sort, particularly if they are desirous of finding plans and instructions for the building of airplane engines of miniature size. Several such engines are given in this volume as well as plans for the building of flying models.

Modern Aircraft, by Maj. Victor W. Page; Norman W. Henley Publishing Company, 2 W. 45th St., N. Y. C.: Probably the most comprehensive work on aircraft at present available is this new book of Major Page's. He was apparently given a free hand as far as space is concerned and for the first time a complete compendium of present-day knowledge in aviation can be had between two covers. Covering as it does both theory and practice, there has been no attempt to condense or shorten the treatment of any portion of the subject matter. The sections of engines and operation are complete in themselves. Briefly, the book, which contains over 800 pages, takes the place of three or four volumes with the additional advantage of being up-to-date.

Schneider Race Biennially

Amendment of the rules to provide for holding the annual Schneider Cup speed race for seaplanes every two years, as proposed by the British and Italian governments, is heartily approved by the Navy Department, according to Edward P. Warner, Assistant Secretary of the Navy for Aeronautics.

Should this amendment to the rules be made, Mr. Warner said, it would attract American participation in future races and also stimulate progress in the technical design of marine aircraft. He explained that the primary object of the races is to promote the improvement of planes by demonstrating the superiority of certain types, or equipment, in competitive performance.

The Schneider Cup race will be held in England in 1928 unless the rules are changed but Mr. Warner said the U. S. Navy would not have an official representative. He could not state definitely now whether or not the Navy would designate a participant and build a plane for the 1929 competition, but said that the Navy's decision might be influenced by a change in the rules.

The Assistant Secretary explained that unless funds appropriated for ex-

perimental aeronautics work are appreciably increased for 1929, the Navy would be unable to spare the money for entering a contestant and plane in the race because these funds are needed to carry on the experimental and scientific work required for regular naval aviation activities.

Mr. Warner declared that he is strongly in favor of private competition in the Schneider Cup Race, and would endorse any movement on the part of private aviation interests to build a plane to be used in the race. He declared that the Mercury Aviation Company, which financed Lieut. Alford J. Williams in his attempt to participate in the 1927 races held in Italy, was to be highly commended and that other aviation companies should emulate this company in the future. Should private interests seek to construct planes for entrance in the next Schenider Cup Race, Mr. Warner said, the Navy would not build a plane.

Mr. Warner declared that he appreciated the attitude of the Air Ministry of Great Britain in urging the change in the rules. He said that he understood, from reports from London, that the British Air Ministry will not enter a team of pilots in the next race, but will give assistance in the building of the plane to be used. According to Mr. Warner, the French and German governments have joined with the British and Italian in advocating that the race shall be held biennially in the future.

New Fokker Corporation

Rumors that a new corporation to manufacture airplanes of the well known Fokker type had been formed, with headquarters at Wheeling, West Virginia, have been confirmed by directors of the new corporation.

The new company, to be known as the Fokker Aircraft Corporation of America, is financed largely by Wheeling and Ohio Valley interests, in combination with the New York financial group which, with Anthony H. G. Fokker, formed the Atlantic Aircraft Corporation early in 1924. The Atlantic Aircraft Corporation, which has its factory at Teterboro Airport, Hasbrouck Heights, N. J., has up to the present been the sole manufacturer of Fokker aircraft in the United States.

The Atlantic Aircraft Corporation will now be a subsidiary of the Fokker Aircraft Corporation of America. The factory at Teterboro Airport will be retained, principally for experimental construction, service and repair work.

For quantity production of the well known Fokker line a factory of over 100,000 sq. ft. floor space will be built immediately at Glendale, near Wheeling, W. Va., with its own flying field connecting with Langin Field at Moundsville and near the Ohio River. Production is expected to commence there early in the spring.

Lorillard Spencer, of New York, president of the Atlantic Aircraft Corporation, is president of the new company. Other directors are:

W. P. Wilson, Wheeling, chairman of the board.

Ralph Kitchen, Wheeling, vice-president.

D. A. Burt, Wheeling, treasurer.

Harland B. Tibbets, New York, assistant treasurer.

George F. Lewis, New York, secretary.

Frank R. Ford, New York.

H. C. Ogden, Wheeling.

William Travers Jerome, the former New York District Attorney.

Other officials, well known in the aircraft industry, are R. B. C. Noorduyn, assistant to the president, and J. E. Morrow, formerly of the Willys-Morrow Corporation, who will manage the Wheeling factory. Anthony H. G. Fokker is actively associated with the new company as designer and consulting engineer, and the company will hold the sole manufacturing rights to Fokker aircraft in the Western Hemisphere.

A New Conquest

(*Continued from page 9*)

capital, and supply this new form of transportation.

Lindbergh's latest feat is a world advertisement of the possibilities of commercial aviation. None of his flights have been in the nature of a stunt. Each leg of the journey was planned just as a commercial flight would be planned and the route followed by him would be practically identical with the routes that would be flown for commercial purposes.

Aviation has again received some publicity that it does not have to pay for and for which it will never be able to pay.

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Bombing Practice

(*Continued from page 19*)

seen from the altitude of the bombing airplanes can well be visualized when it is appreciated that it looks from a bombing altitude similar to a piece of white shoe string six inches in length. The speed of the plane from which the bomb is released is such that it crosses the bridge in one tenth of a second. This means that there is only one spot in the air at which a bomb can be released to hit this bridge, and that an error of one tenth of a second in this release would result in a complete miss. Considering this it can easily be realized that the Army Air Corps had a difficult mission. As a matter of fact it could do exceptionally marvelous bombing, from an accuracy point of view, and still not make a direct hit with a single bomb, just as an expert rifleman might hit a bull's-eye ninety times out of a hundred shots and never actually hit a tack in the middle of such bull's-eye.

To accomplish the purposes desired a certain number of sand loaded bombs and demolition bombs varying in weight from 300 to 1,100 lb. inclusive, were turned over to the Air Corps. To drop this number of bombs required about 300 hours of actual flying. In other words, it was necessary for Air Corps pilots and bombers to remain in the air this period of time in order to carry out these tests. This mission was given the Second Bombardment Group of the Army Air Corps located at Langley Field, Virginia, a distance of 250 miles from the Pee Dee River Bridge, the commanding officer of which organization selected Pope Field, Ft. Bragg, North Carolina, located 62 miles from the Pee Dee River, as a base for his operations against the bridge. The number of miles flown by the bombardment airplanes during this mission totalled approximately 25,000, or a distance equivalent to a flight around the world. There were carried in these bombardment airplanes at different times demolition bombs totalling 61,800 lb. in weight. This amount of flying and this amount of explosives carried was all accomplished without injury or casualty, and without any motor failure or airplane trouble. This demonstrated the system of maintenance and operation which was perfected in order to insure that this mission could be carried out successfully.

The tests commenced on December 19th. The first three days were devoted entirely to the dropping of sand loaded bombs, and the operations were carried on in extremely cold weather and in a gale which seldom decreased in velocity below sixty miles an hour at the flying altitude. The conditions, therefore, under which this flying was undertaken were anything but propitious. The sky was devoid of cloud formations, and, therefore, permitted attaining the altitude necessary for bombing, namely 6,000 and 8,000 feet.

After this phase of the tests was completed it was then desired to know what destructive effect could be accomplished with the 300, the 600 and the 1,100 lb. bombs. Three hundred pound bombs were first dropped at the bridge to determine whether this bomb, either from direct contact or from hits near by, would injure it. After one day of operations it was learned that a bomb of this type offered no serious menace to construction of this type of reinforced concrete bridge. The next morning, therefore, was devoted to the use of 600 lb. bombs. While these bombs accomplished some damage when they made direct hits, it was soon obvious that they would not result in the demolition of the structure. It was also apparent that explosions of these bombs even as close as five or ten feet from the bridge did no effective military damage. It was decided to use the 1,100 lb. bomb containing 550 lb. of TNT. There were only eighteen bombs of this type available for this part of the test. The attack of the bridge with these missiles resulted in nearly 25 per cent direct hits, and quick reduction of that part of the bridge turned over to the Army Air Corps and the Ordnance Department for experimental purposes to a mass of battered concrete and twisted steel. The first bomb which struck the bridge destroyed two approach spans of a length of 80 feet. The second bomb demolished two more of these approaches, and the last two hits, striking close to the huge pier, which supported one of the three large spans over the river, put this portion of the target out of commission.

The first demolition bombs dropped were fused with one-tenth second delay detonators; later, instantaneous detonators were used for the purpose of determining which type permitted the bomb to accomplish the greatest amount of destruction. It was soon discovered that the best type of detonator for a target such as a rein-

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forced concrete bridge was one containing a delay element.

Had the mission been one of merely destroying the bridge it probably could have been accomplished without great difficulty by the method of loading each plane of the Group with 1,100 lb. bombs and releasing these bombs in salvo from a nine ship formation. However, since the purpose of the tests was not merely the destruction of the reinforced concrete bridge, but obtaining valuable military data, it was necessary that the test cover several days and that certain phases be carried out under conditions not designed to cause the immediate destruction of the bridge. These phases gave to the War Department much valuable information and were most important from a technical point of view.

Gliding Planes

(*Continued from page 34*)

about 1½ hours. Over this distance many very level places were covered simply because the flyers gained altitude in time and then glided over these places.

On May 14 Schulz flew, when there was a west wind of 59 to 72 ft. per second, in 95 minutes to Memel and then made a world record of 39 miles with a glider.

4. The operations of starting at various flights were observed closely and investigated with a new instrument, a Kinotheodolit of the Askania-works, by Dr. Raethjen.

5. Aerologic results could be obtained for these and other flights to which were added investigations of air currents by the use of smoke rockets.

At the distribution of prizes on May 17, Nehring and Schulz both received money prizes for their aerologic investigations at the dunes, and Schulz received a special prize for his outstanding performances, while there were also money prizes and honors for other individual performances.

Each visitor was impressed with the fine dune territory and with the idea that there is no better sport than that of gliding or motorless flying. What is needed is an increase in the number of aviators who are keenly devoted to the sport of gliding. It offers opportunities for winning prizes and honors; for securing results in aerologic research, which are of immense value to aviation; for developing unusual skill in handling planes and for taking advantage of the air currents. It is really an excellent way of starting a career in aviation.

Wies Represents Stearman

The Eastern agency for Stearman Airplanes has been taken by George A. Wies, Inc., of Mineola, N. Y. The Wies company maintains a hangar at Curtiss Field and represents, in addition to the Stearman Aircraft Company, both Stinson and Monocoupe.

The Ox-5 demonstrator is expected early in January. As the Stearman is constructed with interchangeable nose to take any motor from an OX to a Whirlwind, without change in the balance of the ship, it is expected to convert this demonstrator to a higher power early in the spring.

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(*Continued from page 29*)

than this. Private industry is now operating by contract our entire postal air mail service. We now have 13 contract mail routes in operation and 7 others under contract with a view to their early operation. We can point with pride to the Federal operation of the postal air mail service. Such operation was necessary in the beginning. We can point with equal pride to the turning of that service over to private industry for operation under contract. That has resulted largely from the policy which this Nation has been pursuing in air navigation. That policy, probably more than any one other thing, made possible the handling of this business by private enterprise. In the realm of navigation by air, I have mentioned elsewhere the provision made in these estimates for carrying on the five-year air programs for the Army and Navy. In our civil work the Coast Guard, the Prohibition Service, and the Forest Service are also operating airplanes. The Department of Commerce is also using planes in its air navigation work. Provision for all of these is made in the estimates herewith submitted, which also carry funds for further development of our lighted airways. With regard to this latter Federal function, the end of the next fiscal year under the estimate herein submitted should see more than 10,000 miles of lighted airways."

The amount of the loans would be limited to two-thirds of the value of the aircraft built plus the cost of hangars and other necessary facilities, the individuals or corporations furnishing the remainder of the capital. The Government loans would be secured by a lien on the property. The bill provides that half the amount loaned shall be payable in 5 years and the balance two years later. Rep. McLeod's bill has been referred to the Committee on Interstate and Foreign Commerce.

A resolution putting the House of Representatives on record in favor of negotiating treaties with Mexico or any republic of Central or South America for the establishment of air mail service with the United States, has been introduced by Rep. Henry W. Watson, of Pennsylvania. It is expected that the measure will receive consideration from the Foreign Affairs Committee inasmuch as the Post Office Department already has approached both the Canadian and Mexican governments on the proposition.

Rep. F. H. LaGuardia, of New York, is the author of a bill which would vest the Postmaster General with blanket authority to operate and maintain air mail service in any part of the United States that he may designate from time to time and to arrange the air routes on which the mail is carried.

Several bills have been introduced concerning the development of military aviation. Rep. Fred M. Vinson, of Kentucky, has proposed the establishment of an aircraft procurement board. The establishment of a new primary flying school and the development of a training plant for the Army Air Service at San Antonio, Texas, is advocated by Rep. Harry M. Wurzbach, of Texas. A bill submitted by Rep. John M. Morin, of Pennsylvania, would authorize the Secretary of War to transfer or loan military aeronautical equipment to schools and museums.

Changed Plugs in Flight

During the recent non-stop flight to Pensacola made by Major E. H. Brainard, Chief of Marine Corps Aviation, in a Fokker tri-motored transport, extremely bad weather was encountered near Richmond, Virginia, which forced the plane down to a few hundred feet above the trees. At this inopportune moment the left engine decided to have spark plug trouble and one cylinder went out, causing the engine to vibrate so much that it had to be shut off.

As the plane was very heavily loaded with fuel it was decided to land and remedy the trouble. Gunnery Sergeant Shepard, mechanic aboard the plane, volunteered to climb out on the wing and change spark plugs while in flight. After Shepard had gotten to the engine, Major Brainard throttled the center engine in order that he would not be hindered in his work. The old plugs were removed, new ones installed, the engine was started up and the plane proceeded on its way, arriving in Pensacola eight hours and ten minutes after the take off at Anacostia.

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The Coast Patrol

(*Continued from page 12*)

lection and purchase of the original five planes now used by the latter. The OL-5 amphibian and the UO-4 seaplane were chosen as best adapted for Coast Guard purposes. The OL-5 amphibians are equipped with inverted Liberty motors with an estimated cruising radius of 500 miles at a speed of from 60 to 103 knots. The gas capacity of

each amphibian is 140 gallons, it is supplied with a Lewis machine gun and carries an experimental radio set developed by the Communications Section of U. S. Coast Guard. These amphibians have a 45 foot wing span and, of course, can land on or take off from water, or land.

The UO-4 seaplane is equipped with a 200 horsepower, Wright J-5 type, air-cooled motor and has a gas capacity of 60 gallons. Its cruising radius is 350 miles and its speed range runs from 55 to 100 knots. It is provided with a Browning machine gun and a serviceable radio set. The seaplane is of the two-seater type and has a wing span of 34 feet.

During flood times, the Coast Guard air craft may be assigned to such special service as searching the areas of inland rivers and contiguous lakes for refugees. In addition, they are available for surveys of flooded districts in order to aid in the establishment of communication with the regions visited by such disasters.

One interesting case was reported along the North Carolina coast previous to the abandonment of the experimental aviation station which Coast Gaurd maintained along the Tar Heel State coast. The wife of an isolated lighthouse keeper was taken dangerously sick with pneumonia. The nearest doctor was 200 miles distant. It would take him 12 hours to reach the lighthouse by motor boat. An experimental Coast Guard seaplane was requisitioned as a conveyance in which to go for the physician. Two hours later, he was attending the sick woman. His prompt arrival by seaplane saved her life.

K. L. M. Service

(*Continued from page 21*)

Official mail carried on this flight was delivered at least ten days earlier than it would have been had it gone by the regular channels.

Former trips have been broken at Constantinople and exasperating delays incurred because of the insistence of the Turkish Government on compliance with their formalities, lasting from two days to a week.

Lieutenant Koppen avoided this delay by the simple expedient of not stopping at Constantinople, flying from Sofia to Aleppo. This demonstrates to a certain extent that certain restrictions are difficult of enforcement in the case of air traffic.

The machine used on the pathfinding flight to Batavia is exactly the same as that built by the Atlantic Aircraft Corporation in this country, but fitted with the three Siddeley Linx engines of 180 horsepower each, instead of the three Wright Whirlwinds of 200 horsepower each, which are used in this country.

Striking cover for Safety booklet issued by K. L. M. for distribution at hotels and public places.

German Aerial Advertising

Night advertising by airplane has been tried out in Germany by a three-motored plane which flew over Hamburg with the names of household commodities showing under the lower wing and illuminated by current generated in the plane, according to local report says the Transportation Division of the Department of Commerce. It is reported that any name or text can be formed and illuminated in this way and that it can be read from considerable distances. It is said that the plan will be followed in other parts of Germany.

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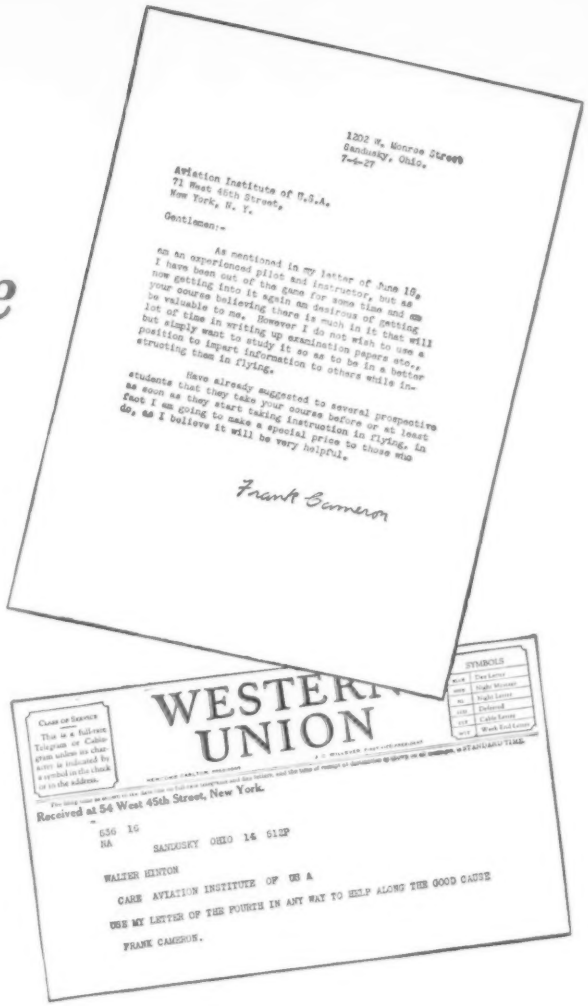

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